APRIL 8, 1961

Chemical Week

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Steel's upswing— When will it come, what will it mean to the CPI? . . . . . p. 21

Plastic equipment— lighter, yet stronger than steel. Key: spiral winding . p. 51

Polybutenes in '61: New uses shine through supply-demand gloom . p. 73

New plant builders play it safe, boost trend to lump-sum contracts . . . . . p. 78

EUROPEAN LABOR— PLAYING FOR

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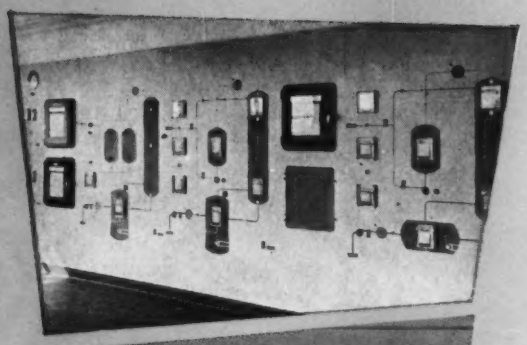

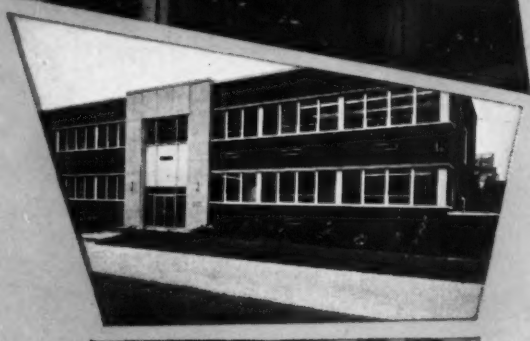

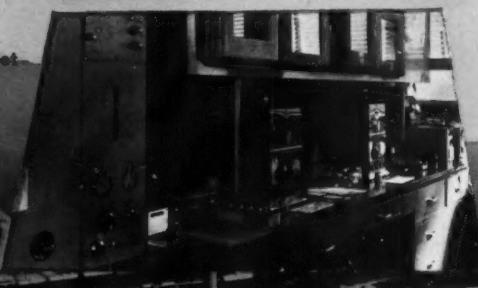

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Benzhydrylamine
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Benzyl Cyanide
Butyroyl Chloride
n-Caproic Acid
Caproyl Chloride
Capryloyl Chloride
p-Chlorbenzhydrol
p-Chlorbenzhydryl Chloride
p-Chlorbenzophenone
p-Chlorbenzyl Cyanide
Cinnamoyl Chloride
Decanoyl Chloride
Dibenzyl Ether
Dicyclohexyl Carbinol
Dicyclohexyl Ketone

INTERMEDIATES

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Diphenyl Methane
Ethyl Formate Tech.
Ethyl Phenylacetate
beta Ionone
Isobutyroyl Chloride
Isovaleric Acid
Isovaleroyl Chloride
Lauroyl Chloride
p-Methoxy Phenylacetic Acid
Methyl Heptenone
Methyl Phenylacetate
Myristoyl Chloride
Oleoyl Chloride
Palmitoyl Chloride
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Phenylacetone
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1932

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ON THE COVER: Punching in for work are French chemical workers, among the leaders of the European labor force now making powerful demands for higher wages (p. 41).

Chemical Week

Vol. 88, No. 14 APRIL 8, 1961

5 **VIEWPOINT—CPI's reputation demands that it comply fully with nation's laws.**

7 **LETTERS**

7 **MEETINGS**

17 **BUSINESS NEWSLETTER**

21 Chemical industry will get boost from steel-output rise—but when?

22 **New fiber ventures in Europe: Darvan for Germany; nylon for Northern Ireland.**

23 New furfural project based on Louisiana rice hull raw material.

23 New, VOP-licensed plant will account for 20% of Japan's ethylene output.

24 **Collier Carbon gets new management team, with William Kaesche as president.**

24 Texas bank—beckoning to CPI plant builders—boosts area's water resources.

27 **WASHINGTON NEWSLETTER**

31 **SALES—Six new chemical-carrying ships signal sea-shipping revival.**

32 New 15-gal. plastic carboy needs no overpack.

41 **INTERNATIONAL—Europe's labor unions find time ripe for wage demands.**

51 **PRODUCTION—Filament-wound glass-fiber equipment readies for CPI uses.**

59 **TECHNOLOGY NEWSLETTER**

63 **SPECIALTIES—How to tackle the potentially rewarding Mexican market.**

69 **MARKET NEWSLETTER**

73 **MARKETS—** Polybutenes capacity races ahead of slow-growing demand.

78 **ENGINEERING—CW survey finds trend to lump-sum plant contracts.**

86 **BUSINESS BENCHMARKS**

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Are Our Ideals Realistic?

THE PRICE CONSPIRACY in the electrical equipment industry is now part of history, but its reverberations will be heard for a long time to come. Many lessons can be drawn from this celebrated case, and the most obvious one is that the business community must obey the laws of the land if it is to preserve its hard-won reputation for responsible citizenship.

At the same time, it behooves the business community to question whether the practical objectives of our industrial society are best served by the ideals embodied in our present laws.

Ours is an idealistic nation, and it's good that it is. But problems arise when our ideals outrun our willingness to uphold them.

A hundred years ago we fought a war over the proposition—stated four score and seven years earlier—that all men are created equal; today we still see legal attempts to circumvent this ideal and deny equal access to the ballot box by all citizens.

Sixty years ago, deploring the excesses of the meat trust, the oil trust, etc., we hailed the trustbusters' ideal of a freely competitive economy and saw superior virtues in small business; today we recognize the need for big business as well as small, but we see major companies flouting the antitrust laws, and—most ridiculous—we see "fair trade" price-fixing proposals and farm price-fixing programs that are the complete antitheses of the philosophy expressed by our antitrust legislation.

Forty years ago we visualized a sober America, which through denial of alcohol would be enabled to work hard and live purely; we remember, or have heard about, the roaring '20s.

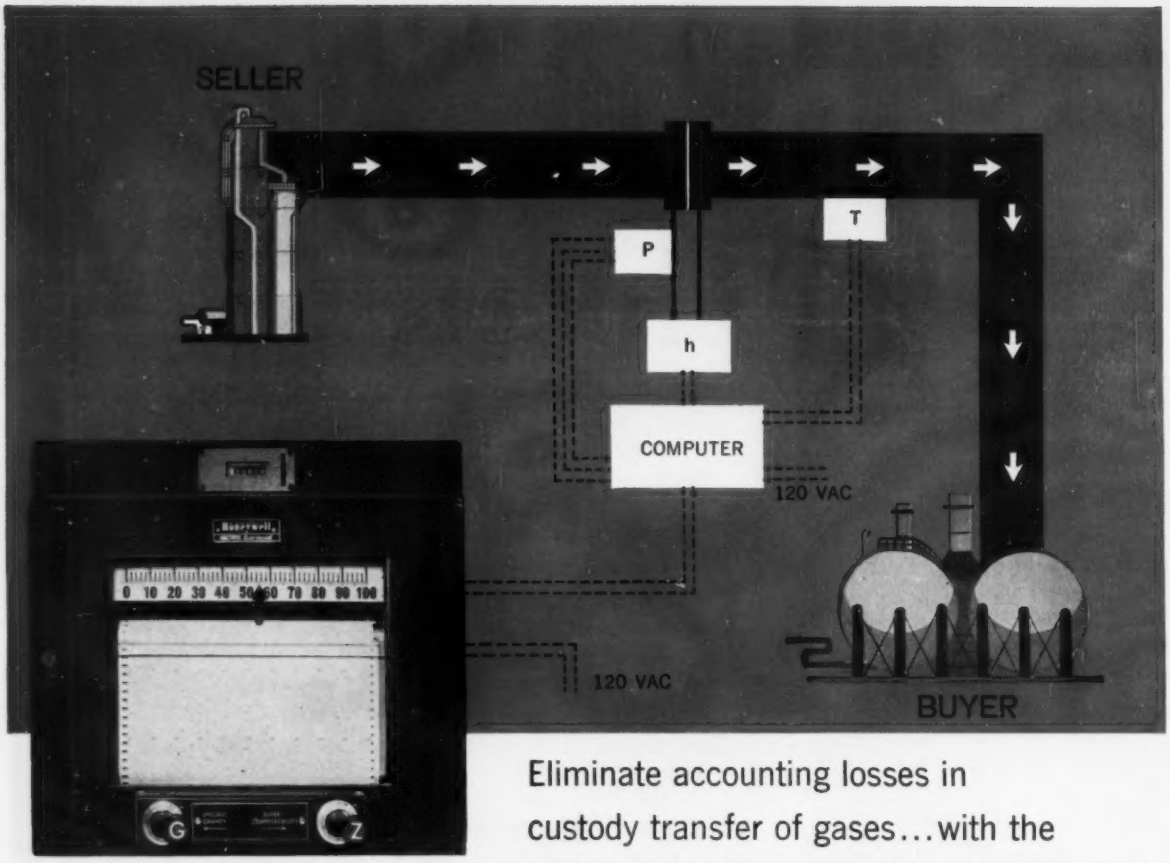
What does all this prove? First of all, that people often pay lip service to ideals they really don't believe in. But second, that circumstances change, and that the guiding principles of one generation are not always valid for the next.

Look at price-fixing. The fear of the turn-of-the-century trustbusters was that collusion and combination in restraint of trade would result in too-high prices that would gouge the consumer. Today the proponents of "fair trade" fear that the efficiency of distribution by large drug and grocery chains would permit too-low prices that would bankrupt the small merchant.

We don't believe in "fair trade." We don't believe in penalizing the consumer by forcing him to pay a subsidy to protect the least efficient retailer. Neither do we believe in the ruinous kind of price competition that occasionally brings gasoline prices down to half of the normal level. Although these price wars may be hailed by gleeful motorists, they must inevitably weaken the over-all economy.

The chemical and allied industries have not proved liable to price scandal. Indeed, if prices were being fixed, profit margins would not have slipped as badly as they have. If anything, chemical producers have been too eager to follow a competitor in cutting prices, too slow to follow him in raising them when good business sense demands it.

Our industry needs price leadership; it doesn't need collusion. The question of identical bids for municipal purchases of chlorine, calcium chloride, etc., for example, is one that deserves thoughtful study. There is no implication that the bids are based on anything but going market prices, but their sameness can give an appearance of collusion where none exists. Some of our laws are unreasonable and even inimical to the national interest, and we should work to change them; but as long as they are on the books, our industry's reputation demands that they be obeyed.



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P = static pressure, psia
T = flowing temperature, °R, (°F + 460)
G = specific gravity
Z = super-compressibility
K = orifice flow constant

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LETTERS

Kirk Laboratories

TO THE EDITOR: There are . . . some errors in the article on Kirk Laboratories (*Feb. 18, p. 32*). The correct name of the parent company is C. F. Kirk Laboratories, Inc. Moore & Co., Inc., is a wholly owned subsidiary. The Moore name will, in the very near future, be changed to Moore-Kirk Laboratories.

Parenteral medications are always administered by the physician—except under certain extenuating circumstances wherein a physician will instruct his patient in the proper methods and techniques of self-injection. Under such circumstances, it is obvious that medications in Ampins will not be recommended for indiscriminate self-medication. The Ampins will be manufactured under U.S. patents.

H. I. HOFFMAN
President
Hoffman Advertising, Inc.
New York

High Labor Costs

TO THE EDITOR: You comment about not selling without buying (*Feb. 11, p. 5*) in connection with the Du Pont booklet on tariff protection. The real issue is: Why do we need tariff protection in a mature, well-developed country? The reason: high labor costs. Why high labor costs? Because we have in this country a labor monopoly that practices legalized blackmail.

We pretend to have a free-enterprise system in this country, but it is only half-free. Consequently we cannot compete with socialized countries in which all segments of the economy are regulated. Until there develops enough intellectual honesty to face up to this basic factor there will be little constructive action.

I think most people fully realize the necessity of having a strong economy in the non-Communist countries and free trade with these countries. However, this is impossible when our labor costs are rising faster than theirs. Halt rising labor costs and the free-enterprise system can easily take care of itself without subsidies.

E. R. BLAIR
Oak Park, Ill.

TO THE EDITOR: I wholeheartedly agree with your editorial "No Selling Without Buying" (*Feb. 11, p. 5*). It is appalling to me that [anyone] . . . should take such a short-sighted attitude toward tariff protection. The "good citizen" reputation that big business has been attempting to earn is seriously damaged by such self-interest-oriented thinking. (Damaged, that is, if there is any reputation remaining after the electrical equipment bid-rigging scandal.)

It is indeed a shame that sincere efforts by many companies can be negated by the . . . woolly thinking of so few!

RICHARD E. REEDER
Baton Rouge, La.

CW welcomes expressions of opinion from readers. The only requirements: that they be pertinent, as brief as possible.

Address all correspondence to: H. C. E. Johnson, Chemical Week, 330 W. 42nd St. New York 36, N.Y.

MEETINGS

American Institute of Electrical Engineers, rubber and plastics industries conference, Sheraton Hotel, Akron, O., April 10-11.

American Management Assn., national packaging exposition, McCormack Place, Chicago, April 10-13.

American Society of Lubrication Engineers, annual meeting and exhibit, Bellevue-Stratford Hotel, Philadelphia, April 11-13.

Chemurgic Council, annual conference; topic: "Agriculture's Next 10 Years," Sheraton-Gibson Hotel, Cincinnati, April 12-14.

Pacific Northwest metals and minerals conference; sponsors: Columbia section of the American Institute of Mining, Metallurgical and Petroleum Engineers, and the Spokane section of the American Society for Metals; Davenport Hotel, Spokane, Wash., April 13-15.

American Institute of Chemical Engineers, New Jersey section, spring lecture series, topic: "The Statistical Design and Interpretation of Experiments"; research auditorium of Union Carbide Plastics Co., River Road (State Route 18), Bound Brook, N.J., April 13, 20, 27.

American Institute of Chemical Engineers, St. Louis section; symposium, including computer applications, pollution control and abatement; Coronado Hotel, St. Louis, April 14.

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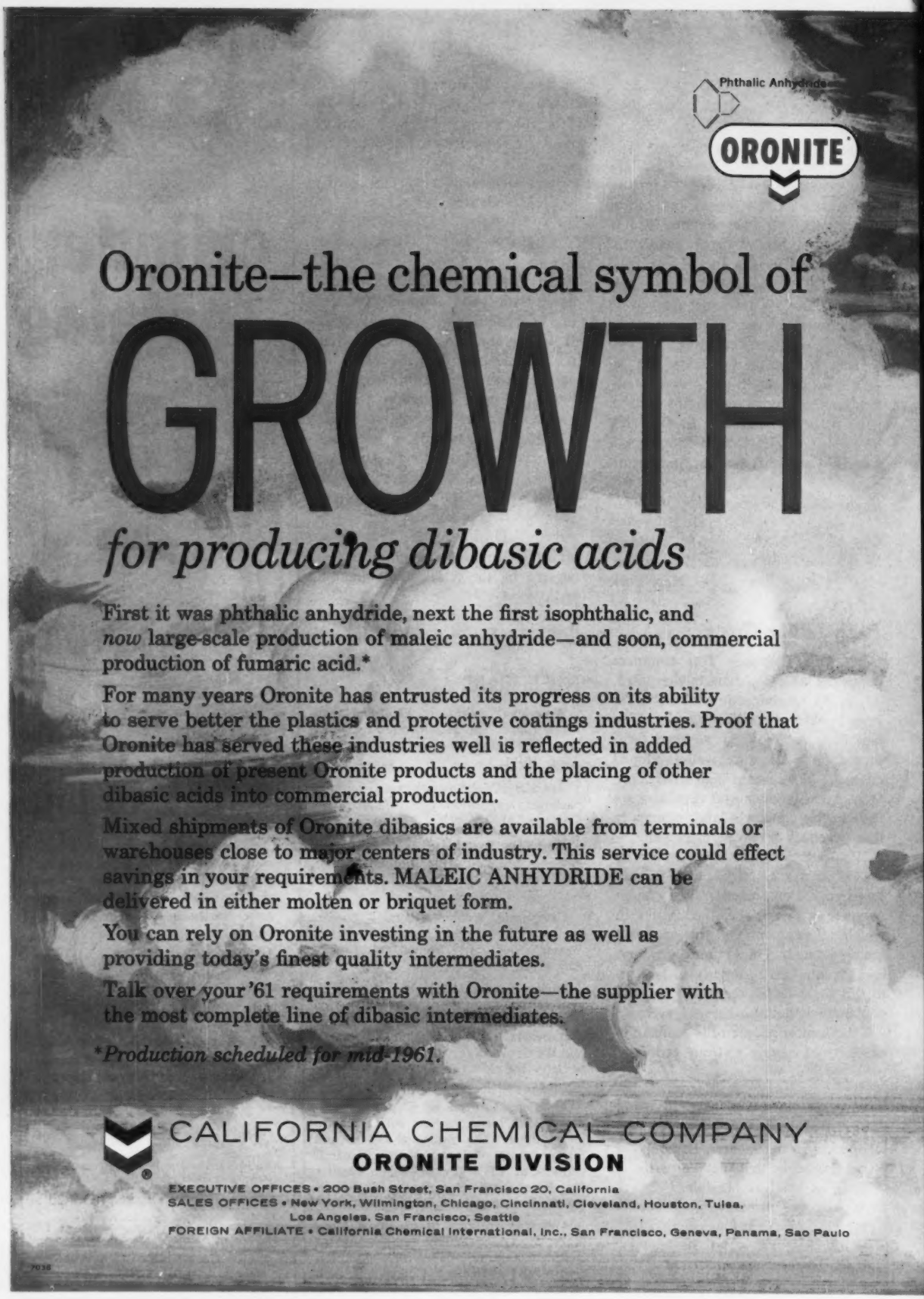

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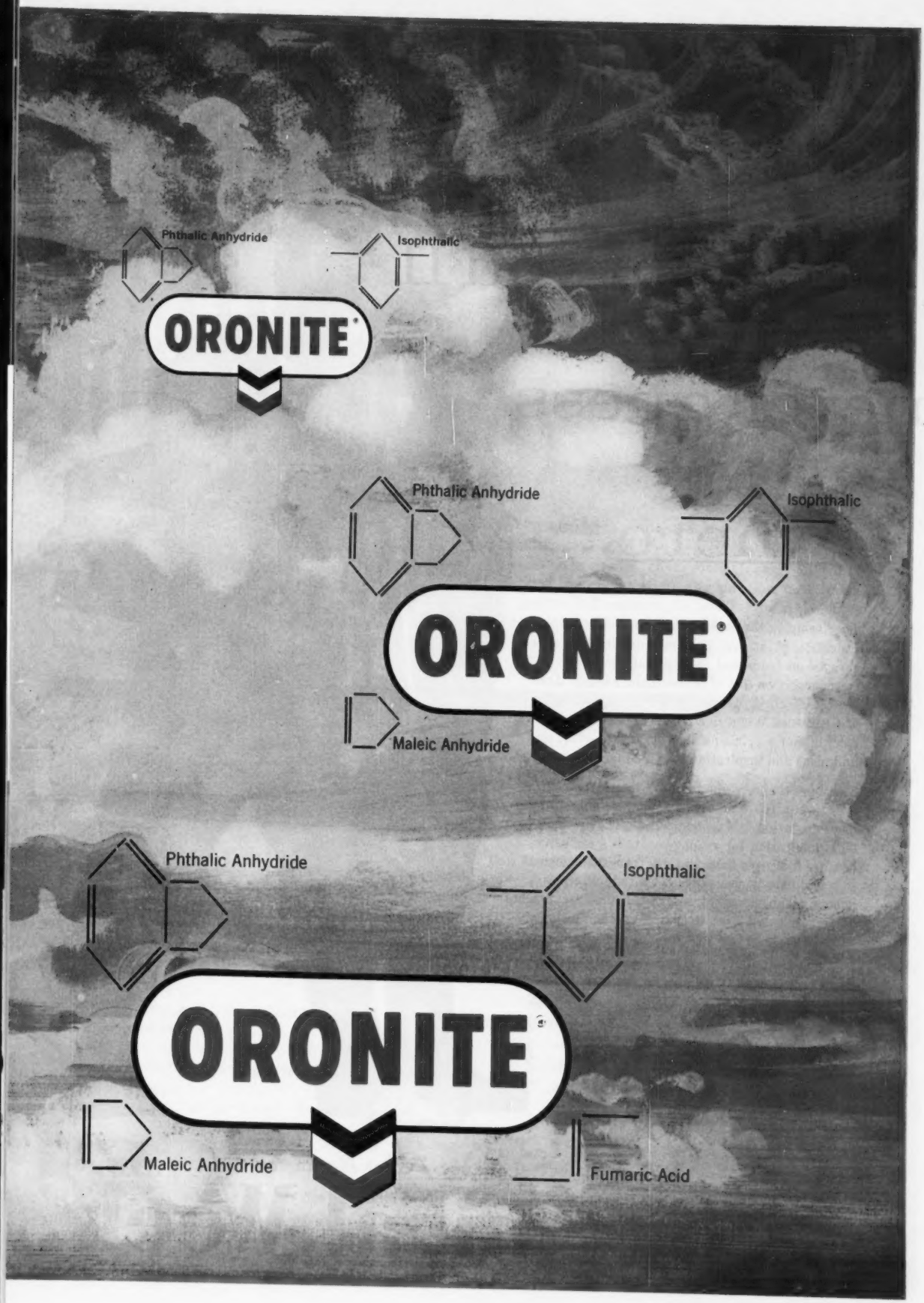
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Maleic Anhydride
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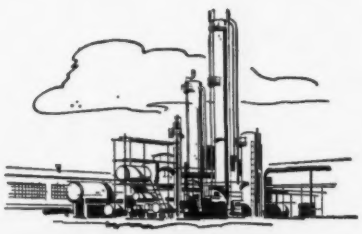

*This statement was contained in an engineer's report concerning the use of CO_2 as a coolant by a company that sulfunates straight chain alcohol. CO_2 sparged directly into the chemicals in the reaction tank, maintains a controlled temperature of -70° F or below. Total time for cooling *55 minutes . . . former time 3 to 4 hours.*

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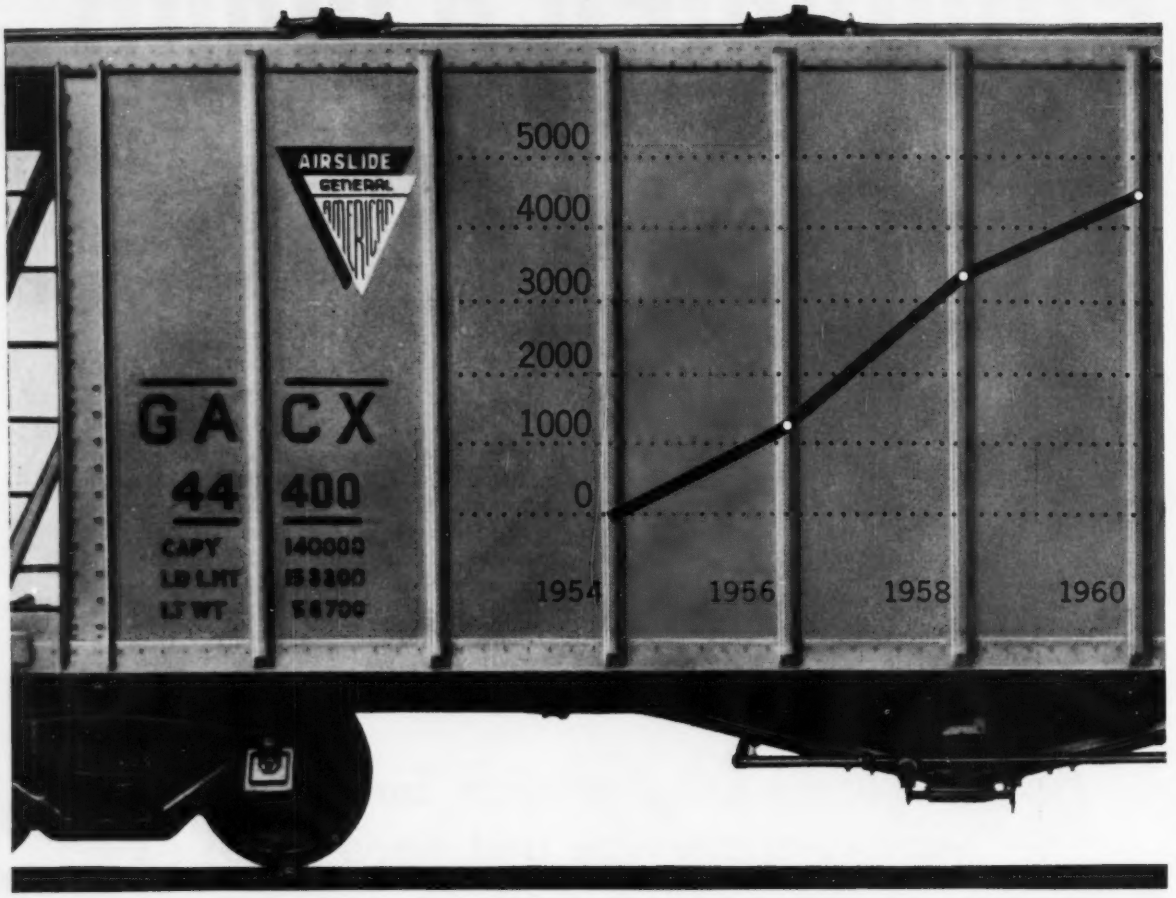

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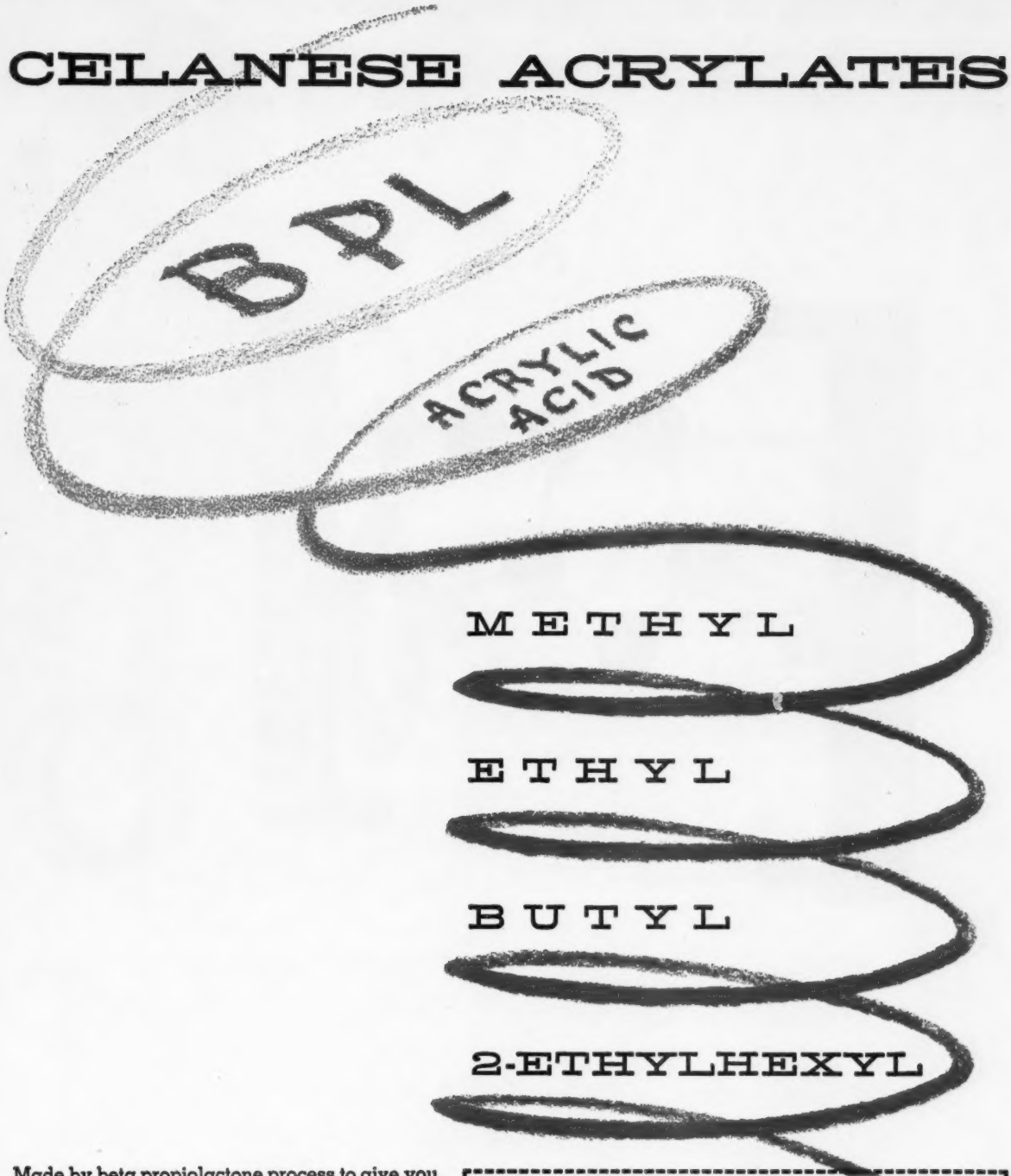

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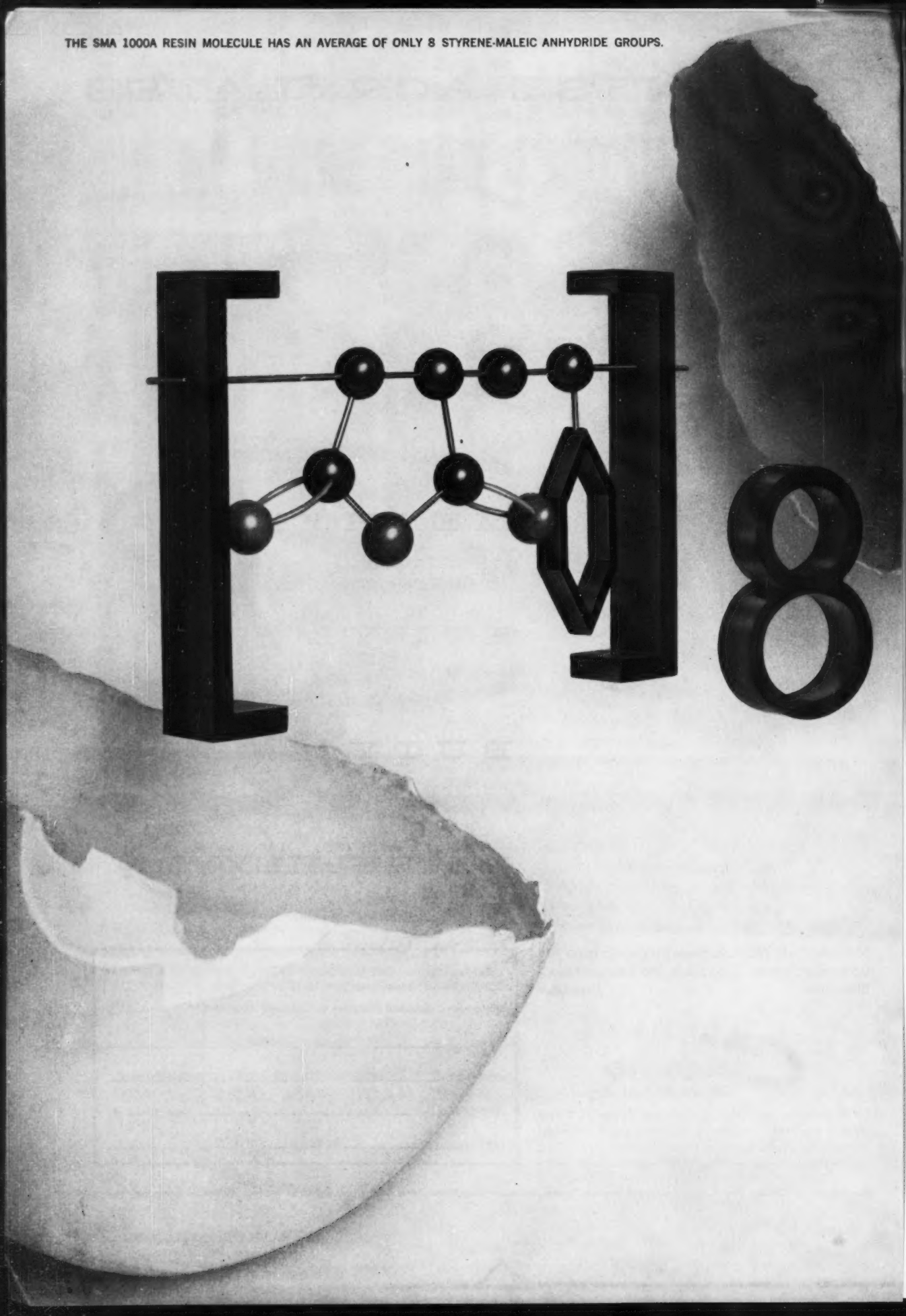

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JEFFERSON CHEMICALS

Business
Newsletter

CHEMICAL WEEK
April 8, 1961

Signs of general economic recovery, though still scattered, are multiplying. You can see it in reports this week of rising employment (too late for inclusion in March figures), in steel, auto, construction industries.

Indications are even more clear in the chemical industry. There's a stirring of inventory buying, after months of hand-to-mouth operations; a rash of new expansion plans; a pert upturn in chemical stock quotations over the past three months.

Take the last one first. Analyze stock price indexes (Securities & Exchange Commission) on the New York Stock Exchange from Dec. 31 to end-of-March, and you come up with these noticeable results: composite average, up 10.5%; industrial chemicals, up 7.9%; pharmaceuticals, up 10.5%; other chemicals, up 14.2%.

•

What about expansions and moves into new markets? American Cyanamid, with a sharp eye on entering the expanding methyl methacrylate products field, last week swapped a chunk of its common stock for virtually the entire business and assets of Wasco Chemical (Cambridge, Mass.). The acquisition, and its subsidiaries, manufacture and distribute cast methyl methacrylate sheets and other plastic construction products.

And Wyandotte Chemicals is ready to put about $3 million into a new organics plant site. It prefers Wyandotte, Mich., but local labor difficulties reportedly may drive the company into building the installation in Louisiana, possibly in the Baton Rouge area.

A new bleached paperboard company will be formed by Lily-Tulip Cup and International Paper. No details are available on how the new company will be financed or the amount of capitalization, but the venture—Red River Paper Mill (Springhill, La.)—will have an estimated production capacity of 250 tons/day of bleached paperboard for manufacture of cups, milk and food containers, other products. Slush pulp will come from International's present Springhill plant adjacent to the new plant site.

The Great Lakes area will have its first methanol plant in late '62 or early '63. Du Pont will build a "multimillion-dollar," 30-million-gal./year unit on a 600-acre tract near Huron, O.

Final design studies are under way now, and construction should start late this year, if the Federal Power Commission okays a pipeline extension that would supply the plant with natural gas. Du Pont now serves the Great Lakes area from its methanol plant at Orange, Tex.

•

Shell Chemical is rushing its polypropylene project. The 80-million-lbs./year venture, slated for Woodbury, N.J., will be designed and

built by three firms—to expedite the project, "help the antirecession efforts of the nation," says the company.

The process units will be engineered and erected by C. F. Braun (Alhambra, Calif.). Utilities and maintenance facilities (including boilers, water-treating units, cooling towers, warehouses, etc.) will be constructed by Catalytic Construction (Philadelphia). The Ballinger Co. (also of Philadelphia) will be architect for the administration building and research and technical services laboratory.

•

A hydrocarbons tariff donnybrook may erupt in Ottawa next month, when the Tariff Board there opens hearings on rates. Expected to spark a controversy is a chemical industry committee's recommendation that basic aromatics (e.g., benzene, toluene, xylenes) be included in the 15%-British-preference, 20%-most-favored-nation category.

Big British-American Oil (soon to be making BTX at Montreal) backs the stand that rates should be applied uniformly to the three aromatics, cumene and ethyl benzene whether they're derived from coal tar or petroleum.

Canadian coke-oven operators originally asked the industry committee to support 15-20%, but at least one company (Stelco) reportedly would settle for a 7½-10% rate.

Meanwhile, Polymer Corp. (Canada's largest benzene user) is pressing for duty-free status for these aromatics. Imperial Oil is leading the fight to retain present specific duty (⅓¢/gal.), with support from chemical specialties makers. Others, notably Canadian Oil and Texaco Canada, haven't yet notified the board of their positions.

The upcoming squabble, say Canadian observers, will point up the conflict between producers and consumers on the principle of higher tariffs for many chemical products.

•

Some foreign corporations are doing well in U.S. markets. Directors of Ciba (Switzerland), for example, have just revealed that its worldwide sales in '60 topped $260 million. U. S. sales of dyes, plastics, pigments, pharmaceuticals and other chemicals accounted for $78 million.

•

Creeping inflation in Japan could have repercussions on its chemical trade, stir up a hot political issue. So far the Japanese consumers' price index is up only about 4% over '59, but fears are mounting that an upward spiral will develop this summer under impact of prime minister Hayato Ikeda's plan to double national income in 10 years.

One proposed counterinflation move—speedup of the present economic liberalization policy (including a cut in restrictions on chemical imports)—would be fought hard by Japanese producers already caught in a tightening wage-price squeeze.

Cooper-Bessemer compressor shown is one of two units for compression of synthesis gas.

Henry LaRue, *Ammonia Area Superintendent, Spencer Chemical Company, Vicksburg, Mississippi explains...*

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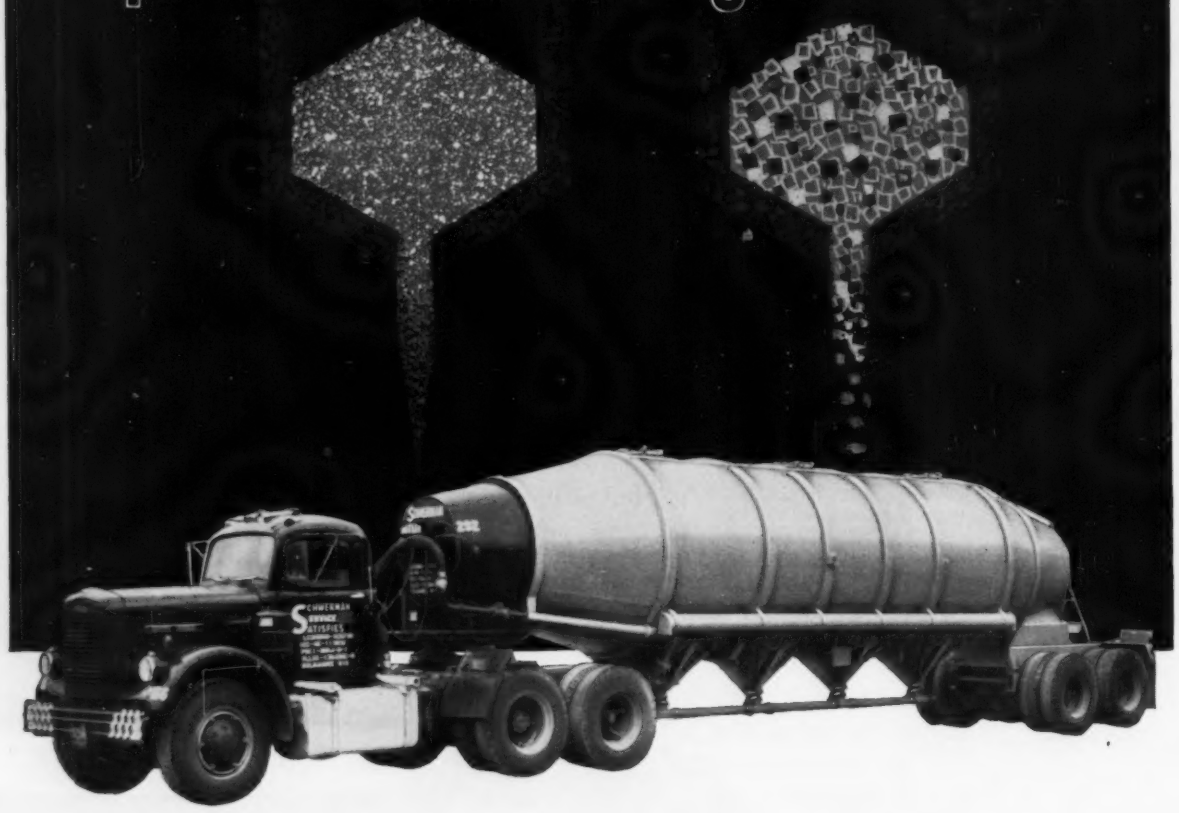

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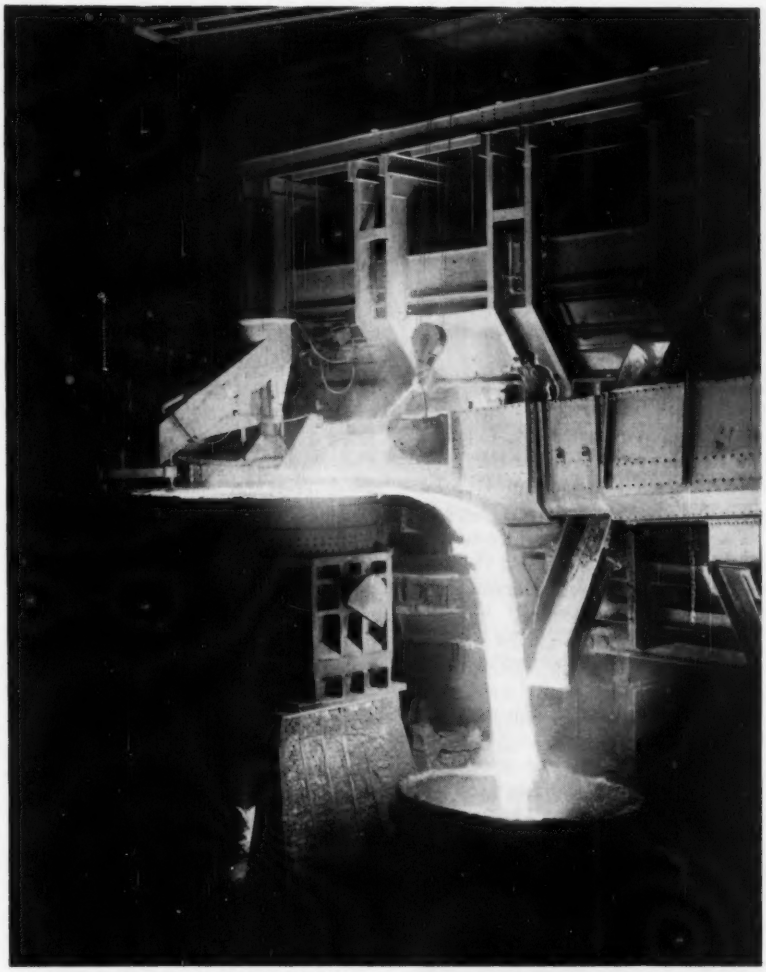

At U. S. Steel's Fairless Works, molten steel flows from furnace.

Steel Warms '61 Hopes

Chemical companies' hopes for '61 are brightening as the steel industry — key buyer and supplier — looks for big output rise by June.

Last week's slight but perceptible upturn in the steel industry—a gentle pickup in both new orders and production—holds promise of a gradual recovery leading to a nearly "normal" output total for the year. For the chemical industry, a $50-million difference in '61 sales volume is riding on that eventuality.

Latest favorable signs—such as a modest increase in auto sales and in auto makers' purchase orders for steel—have prompted some steel company executives to predict hopefully that '61 steel production now will start climbing toward a 12-month total of 94 million ingot tons—about the same as in '59.

If steel output does follow such a path, it's estimated that the steel companies will use about $125 million worth of chemical products (*CW, Nov. 19, '60, p. 79*). And about $260 million worth of coal-chemical materials—used mainly as raw materials for chemical manufacture—will be turned out as by-products of coking and coal-tar distillation operations.

But if '61 steel production continues to drag along at the same drowsy rate as during the major portion of the first quarter, then the year's output could fall short of 80 million ingot tons; and the steel industry's consumption and production of chemical materials would sag accordingly. And, of course, chemical companies would stand to lose business through secondary and indirect effects of such a middling performance.

No Direct Ratio: Actually, steel company spokesmen emphasize that there is no precise formula tying steel production and coal-chemical production together—only a general relationship. For example, yields of chemicals per ton of coal can vary considerably with changes in coking times or coal mixes.

And some steel mills reportedly have sizable inventories of coke, so that for those mills a considerable increase in present low operating rates might not require any increase at all in coking operations for a matter of weeks, or even months.

On the other hand, a fairly close correlation generally prevails between steel production and the steel mills' use of chemical materials—i.e., sulfuric and hydrochloric acids, oxygen, lime and alkalis. Also of keen concern to many CPI companies: steel companies' '61 requirements for various high-purity alloying elements, such as ferromanganese, chromium, molybdenum and boron (*CW, Sept. 4, '54, p. 79*).

Snowballing Effect: Certainly the increase in steel production last week was small—probably only about 3% over the preceding week's output, based on estimates by the American Iron and Steel Institute. But the continuation of the upward trend (which started after November's low point) was, in itself, enough to arouse optimism. And considering that steel buyers' inventories are regarded as extremely low, and that at least a sea-

sonal increase in construction activity is in the cards, it appears that steel production will continue to ride that gentle uptrend for some weeks to come.

According to a theory held by some industry experts, any such rise in steel production has a briskly compounding effect. They reason that most steel customers' inventories are based on the time needed to get delivery on steel shipments and that steel delivery times are closely related to the steel mills' operating rates.

If this theory proves out in the present situation, steel producers will soon notify their customers that lead-times will be somewhat longer; those customers will then order more steel to compensate for the longer delivery times; and those increased orders will lead to higher operating rates and still longer delivery times.

In fact, some steel producers already have told their salesmen to advise customers to allow a longer delivery time, so the snowballing process may be starting. Adherents of this theory contend that the snowballing effect could boost the steel industry's operating rate from the present 55% of capacity to as much as 75% of capacity within a couple of months; and some steel company executives are hoping to reach that rate during the second quarter.

Boost from Expansion: Steel men aren't counting too heavily on recent slightly encouraging developments in the auto industry, such as Ford's decision last week to recall some workers who had been previously laid off. But they are hopeful for a fairly prompt and positive lift from substantial appropriations on the part of U.S. business as a whole for new plant and equipment this year.

This trend now appears to be well established. The latest government survey this year indicates that '61 will be one of the biggest years on record for capital spending by industry. Plant and equipment expenditures for '61 are pegged at $34.6 billion, off only 3% from last year's high (*CW Business Newsletter, March 11*).

For chemical companies — somewhat dispirited because of slow business during the first quarter — the modest but continuing upturn in steel brings prospects of better business in each succeeding quarter and a fairly good year as a whole.

Spurring Foreign Fibers

The growth of foreign synthetic fiber production is underscored by two new developments: (1) formation of a joint subsidiary by Celanese Corp. of America and Farbwerke Hoechst to produce and market Darvan in Europe; (2) planned establishment by a British-Dutch firm of a plant in Northern Ireland to produce polymer for nylon yarn and plastics.

Celanese's working agreement with Hoechst comes before the former has started domestic commercial production of Darvan, the nitrile fiber acquired last year from Goodrich Chemical (*CW, Jan. 16, '60, p. 21*). Under terms of the arrangement, the just-formed Bobina Faserwerke GmbH., jointly owned by Celanese and Hoechst, will produce the fiber, tradenamed Travis, while Hoechst will handle marketing.

The background of Darvan's domestic production offers clues to the reasons behind Celanese's overseas venture. Goodrich Chemical initiated Darvan market development in the early '50s and came up with a wool-like fiber, apparently well-suited for luxury coat fabrics, bulky knitted sweaters and hand-knitted yarns (*CW, March 8, '58, p. 101*).

But pilot-plant operations at Avon Lake, O., revealed two strong negative features: high cost and dyeing difficulties. Result: commercial production was delayed. Celanese, more experienced in fiber technology and marketing, bought the Goodrich production and development rights, was able to solve the dyeing problem so that Darvan could take a full range of colors. Consumer cost has been cut to $1.45/lb.

Celanese's Blancke: Jump into German production for new European market.

Despite the price reduction, Darvan remains more costly than Orlon acrylic (at $1.20/lb.), a formidable competitor for use in knitted fabrics. Celanese points out, however, that Darvan, a nitrile fiber, is not identical to the acrylics.

The company claims three important advantages: resistance to pilling (or balling-up of fiber); shape retention; and better hand. But applications of Darvan and acrylics do overlap, and price difference and intense competition may have helped convince Celanese President Harold Blancke that Europe offers a better immediate market for the former.

Another possibility that could have influenced the Celanese-Hoechst hook-up is the supposed European demand for heavy knitted and woven fabrics, using wool or wool-like substitutes. But observers say that even here the venture may be in for some rough sledding, due mainly to the rapidly increasing European acrylic fiber production.

Celanese and Hoechst, however, are thoroughly familiar with these economic facts of life, and, as one Celanese official put it, neither firm would be pushing Darvan "unless it could make money." And to point this up, eventual Darvan capacity of the Bobingen, Bavaria, plant (going onstream in early '62) is expected to hit 32 million lbs./year.

When German production of Darvan begins, Hoechst will supply all the raw materials. Since it is a basic producer of acetic acid and vinyl acetate, Hoechst will convert these materials into chemical intermediates to supply to Bobina along with the other fiber components.

In Ireland, British Enkalon, an Anglo-Dutch company formed by British Enka, Liverpool rayon producer, and Algemeene Kunstzijde Unie, will construct a nylon yarn and plastics raw-material plant in Antrim, Northern Ireland. Site negotiations are under way, and the plant is due onstream next year.

Freight Bag Defeat

Last week the Interstate Commerce Commission reached a compromise on the controversial issue of who should be allowed to use collapsible shipping containers. Its decision: only tank truckers can carry premounted rubber bags and containers, while general commodity truck operators may use collapsible containers only if they are filled off the truck and then loaded.

The decision comes as a blow to many chemical shippers who had supported the general commodity truckers in their bid to gain full authorization to use the new, collapsible rubber bags and aluminum bins (*CW, Oct. 29, '60 p. 57*).

CPI traffic men had hopes that they might win lower freight rates if general commodity truckers were allowed to use collapsible tanks and bins, since these carriers can generally get revenue-producing return hauls more easily than can highly specialized tank-truck operators.

The decision—ICC's fifth in the long proceedings—drew strong dissent from two of the 11 commissioners. It is expected to restrict sharply the efficient use of the cost-cutting collapsible units.

New Try for Furfural

The first commercial plant for producing furfural from rice hulls is reported to be in the planning stage for Crowley, La., in the heart of the Louisiana rice area. If the $500,000 plant is built, it's expected to make 6,000 tons of furfural annually from 90,000 tons of rice hulls.

The process to be used was tested in a Lake Charles, La., pilot plant, owned by Falcon Chemical Co., a subsidiary of Chatham-Reading Chemical Corp. (New York). However, Chatham has no connection with the currently proposed plant, said to be backed by Louisiana rice millers. Discussions have been on and off for more than a year, and now the U.S. Dept. of Agriculture is studying the process.

Industry observers wonder where the company will market its furfural, which is believed to have little market growth potential. Producers have recently dropped the price of furfural 1¢/lb. to promote its use.

Dow's Barnes: Taking over in Dow's big Texas Division.

New Man in the Saddle

A. P. "Dutch" Beutel is turning over the reins of the Dow Texas Division to Earle Barnes, formerly Beutel's executive assistant and director of organic research for the Texas Division.

Barnes will continue to report to Beutel, vice-president in charge of Gulf Coast operations. (Beutel also supervises the Dowell, Louisiana, Engineering and Construction Services, and Brazos Oil and Gas divisions, in addition to Mexican operations.) Object of the move: to get more depth in top management. And 68-year-old Beutel—although his pace has not perceptibly slackened—is beyond normal retirement age.

Barnes has been with Dow since he received his master's in chemistry (at Nebraska) in '40, has headed Texas organic research since '43. Texas Division research at the same time is being reorganized. Geological exploration and development of new mineral resources will come under the aegis of a new minerals department. C. M. Shigley, formerly director of technical research, will head this group.

J. M. Leathers, director of organic research for the past several months, will be moved up to director of research and development. He will be in charge of the division's organic and inorganic research. All pilot plants will be directed by K. M. Tolleson, who reports to Leathers.

Ethylene for Japan

Idemitsu Kosan, a leading Japanese oil refiner, has presented for approval to the Japanese government its plan to build what would be the core of the country's largest petrochemical center—a naphtha steam cracker with an ethylene capacity of 100,000 metric tons/year.

The plant is to go up in Tokuyama, in southern Honshu, on a 106-acre site. Total cost would be $36 million, including $4.3 million in licensing fees to Universal Oil Products, which won the contract against competition from other U.S. companies. (Stone & Webster had been linked with the projects in press reports, but says it had never entered an agreement with Idemitsu.)

The plant would be larger than any of Japan's four other ethylene producers—Mitsui Petrochemical at Iwakuni; Mitsubishi Petrochemical at Yokkaichi; Nippon Petrochemical at Kawasaki; and Sumitomo Chemical at Niihama. With the four other producers' ethylene plants, total Japanese capacity will be above 392,000 tons, besides Idemitsu's projected capacity, which would go onstream in '62.

Ready Outlets: As part of its production proposal, Idemitsu has lined up seven customers.

About 95,500 tons of the ethylene would go to Nippon Gas Chemical, Tokuyama Soda, and Toyo Soda, which would form the nucleus of the multicompany complex. And a total of 52,500 tons/year of propylene would go to Tokuyama Soda, Nippon Gas Chemical, Kanegafushi Spinning, and Toyo Soda.

Lined up for the other products: Kanegafushi Spinning, 12,000 tons/year of isobutylene and 3,000 tons of benzene (with Hodogaya Chemical). Nippon Polyurethane and Takeda Pharmaceuticals will take 3,700 tons/year of toluene. And Nippon Gas Chemical will buy 12,300 tons/year of xylene.

Nippon Gas Chemical plans to make acetaldehyde, propylene glycol and xylene resins.

Tokuyama will make polyethylene, ethylene dichloride, and polypropylene, while Toyo Soda plans to make EDC and propylene oxide. Kanegafushi will ferry Idemitsu products across the bay to make polyisobutylene, acrylic resin, alkyl benzene.

Smallness: No Handicap

Smaller chemical companies weathered the '60 economic downturn as well as, or better than, most larger concerns, a check of operating data shows this week.

Among the more successful companies last year were the two principal beryllium producers: Beryllium Corp., which boosted sales 14.2%, to $24.3 million, and earnings 7.2%, to $1.6 million; and Brush Beryllium, whose sales shot up 59.1%, to $28.8 million, and earnings 35.9%, to $2 million.

And Southern Nitrogen hiked its sales 23%, to $11.7 million, with earnings rising nearly 51%, to $1.3 million.

Only relative terms are used in reports on three chemical branches of larger concerns. Trubek Laboratories —acquired in '60 by Universal Oil Products—"experienced a successful year" as UOP's total sales and earnings climbed to $21.8 million and $3.55 million, respectively. Frontier Chemical Co.—a division of Vulcan Materials—"operated at near-capacity levels"; its sales increased 7% and its earnings "were at an all-time high." Thiokol's chemical division maintained its '59 volume of sales to commercial accounts, but its sales to Thiokol's rocket divisions dropped $2.5 million.

Two victims of abrupt changes in the nation's defense procurement program were Foote Mineral and Metal Hydrides. Foote's sales dropped 17.6%, to $16.6 million, largely because of the loss of lithium sales to the Atomic Energy Commission, and earnings fell 53.5%, to $534,432. Metal Hydrides suffered a 68.3% drop in sales, to $1.9 million, and a 76.4% setback in earnings, to $75,045—mostly because of the Navy's early termination of a $13.5-million sodium borohydride contract.

Two companies are reporting for the first time since they were reorganized through merger or acquisition. Minerals & Chemicals Philipp Corp. says *pro-forma* after-tax earnings moved up 3.6%, from $8.4 million to $8.7 million. Nixon-Baldwin Chemicals had sales of $7.5 million and profits of $237,827 after nonrecurring expenses of $175,899 in connection with a $4-million stock issue.

Results for other small companies: Chemical Process Co. (Redwood City, Calif.)—sales up 19%, to $6.1 million; earnings up 10.8%, to $365,365. Chemical Products Corp. (Providence, R.I.)—sales up 3.8%, to $3.5 million; earnings down 1%, to $102,685. Chemway Corp.—sales down 1.8%, to $8.7 million; earnings down 63.5%, to $159,105. Cowles Chemical Co.—sales up 13%, to $9.8 million; earnings up 18%, to $373,986. Pierce & Stevens Chemical—sales up 2.6%, to $8.3 million; earnings down 0.8%, to $615,584. Vitro Minerals (jointly owned by Vitro Corp. and Rochester & Pittsburgh Coal)— sales up 13%, to $2.2 million; earnings up 53%, to $542,363.

New Chief for Collier

Collier Carbon & Chemical Co. (Los Angeles), a Union Oil Co. subsidiary, is undergoing a wholesale shuffle of key personnel that reflects an accelerated expansion program. Former Execuitve Vice-President William C. Kaesche now becomes president, succeeding founder Robert T. Collier, who becomes chairman of the board. The vacancy on the board created by the retirement of chairman W. L. Stewart, Jr., will be filled by Dudley Tower, president of Union Oil.

Part of Collier's expansion stems from Union's latest acquisition, Pacific Guano Co. (*CW, March 18, p. 24*), which Collier will operate as an independent fertilizer manufacturer, marketing in the Western states. Although activities of PG appear to be in direct competition with Collier's operations in some areas, no changes are planned. William H. Foster has been shifted from an executive post at Collier to presidency of PG.

Besides taking over PG's nine distributing plants, Collier has opened three new production units during the past six months: a sulfuric acid plant (Los Angeles), a petroleum coke plant (Contra Costa, Calif.) and a phosphoric acid plant (Kellogg, Ida.).

Collier's sales are now 30% higher than they were when Collier was merged with Union's Brea subsidiary in '57. Last year it had record sales of $24.3 million, a 13% increase over '59. Collier put $6 million into capital expenditures last year, expects to invest $11 million in '61.

Construction of a petroleum naphthalene plant is under way in Delaware in a joint venture with Tidewater Oil Co., and groundbreaking for a similar plant in Los Angeles is scheduled for later this year, also in partnership with Tidewater.

Using Water as Bait

Texas — already attracting more new chemical construction than any other state (CW, March 11, p. 23)— is stepping out this week to attract still more new chemical processing plants. New moves to lure industry:

- The city of Houston and the Trinity River Authority have patched up their differences and made a start on the Trinity River water development program. They awarded to Brown & Root (Houston) a $1-million contract for drawing up an engineering plan for the project, which will be based on a dam to be built near Wallisville, about 25 miles east of Houston. Houston has voted a $50-million bond issue for this work. The dam would store fresh water intended primarily for new industries on the north side of the Houston Ship Channel.
- Texas National Bank (Houston) has commissioned the Lockwood, Andrews & Newman engineering firm to make "a comprehensive survey of water resources on the Texas Gulf Coast" for use in promoting industrial development in the area.

KEY CHANGES

Edward L. Steiniger and **Albert Green** to the board of directors, Kennecott Copper Corp. (New York).

Charles H. Sommer to the board of directors, The Chemstrand Corp. (Decatur, Ala.).

Carlo Giraudi to vice-president (research, development and engineering), Witco Chemical Co., Inc. (New York).

C. B. Howell to vice-president and general manager, pharmaceutical-maker A. H. Robins Co., Inc. (Richmond, Va.).

Edward F. Beyer, Jr., to vice-president, Overseas Chemical Division, W. R. Grace & Co. (New York).

national roundup

Rounding out the week's domestic news.

Companies

Union Carbide (New York) has sold its old, six-building headquarters to Koeppel & Koeppel, real estate operator, for a price "very near" the $12 million that Carbide had been asking. Carbide's new headquarters building is at 270 Park Ave.

Potash Co. of America's (Carlsbad, N.M.) stockholders will vote at the April 12 special meeting to increase authorized shares by 300,000 to 1.5 million. The increase would permit stock dividend declarations during the next two years.

American Metal Climax's (New York) wholly owned Canadian subsidiary, Northwest Amax, will help finance —together with Ventures and Dome Mines—construction of a tungsten ore concentrator for Canada Tungsten Mining Corp. In return, Amax, at completion of the financing, will gain a 35% interest in Canada Tungsten.

National Distillers and Chemical (New York) and Bridgeport Brass (Bridgeport, Conn.) have tentatively agreed on details for the proposed merger of the two companies (*CW, Feb. 11, p. 24*). Final approval awaits stockholder say-so at the NDC and Bridgeport annual meetings, both to be held on June 14.

Expansion

Liquid Alum: Chemical Construction Corp. (New York) has been awarded a contract by the Border Chemical Co. (Winnipeg, Man.) for the design and engineering of a liquid alum plant. The unit, at Springfield, Trascona, Man., is due onstream this June. Expected capacity: 90 tons/day of liquid alum.

LPG, Sulfur: Shell Oil Co. (New York) has awarded Brown & Root (Houston) the construction contract for a gas processing plant near Bryans Hill, Tex. Work will begin this June; the unit is expected onstream by November. Capacity: 5,600 bbls./day of natural gas liquids and 130 long tons/day of sulfur.

Rock Salt: Cargill Co. (Minneapolis) will drill a mine shaft—16 ft. in diameter, 1,300 ft. deep—to tap its Belle Island, La., salt deposit, estimated at 99% sodium chloride. The mine is designed for production of 400,000 tons/year of crushed rock salt. All crushing, processing, screening and storage facilities will be underground.

Lime: Air Reduction Co.'s (New York) Chemical and Carbide Division expects to start work within a few weeks on a $2-million lime kiln at Louisville, Ky. The kiln, similar to the Calvert City, Ky., unit put onstream in '60, will convert calcium hydrate, a calcium carbide by-product, into lime, which will be used to produce more calcium carbide for acetylene. Production is scheduled for early '62; output should reach 330 tons/day.

foreign roundup

Rounding out the week's international news.

Fertilizer/Portugal: Uniao Fabril do Azoto (Lisbon) will build a fertilizer complex near Lisbon. Capacity: ammonia, 180 metric tons/day; urea, 40,500 tons/year. Included: nitric acid, ammonium nitrate, and nitro-limestone. Due for completion: '62. M. W. Kellogg and two subsidiaries have won contracts for the ammonia and urea plants and other work.

Rubber/Germany: Chemische Werke Huels and Goodrich Gulf Chemicals have signed agreement to exchange and jointly utilize know-how in stereospecific rubbers. Huels will soon start building a plant for polyisoprene and polybutadiene.

Benzene/Argentina: YPF, the government oil agency, has awarded Hydrocarbon Research (New York) and Minera Alumine (Buenos Aires) a contract to design and build a refinery to make 8,000-11,000 bbls./day of high-octane gasoline and 720 bbls./day of benzene. Benzene capacity can be expanded to 1,200 bbls./day to meet future demand.

Trade/Finland: The agreement associating Finland with the seven-nation European Free Trade Assn. was signed last week. Finland's '59 chemical imports: $76.1 million. Exports: $5 million.

Dividends/Germany: West Germany's "Big Three" —Bayer, Hoechst, BASF—have reportedly decided to increase their dividends from 16% to 18% as a result of last year's booming business. Corollary aim: to build popularity at the stock exchanges. Following Deutsche mark revaluation, quotation value of the companies' stock slipped from $3,787.5 million at the end of '60 to $3,770 million by March 24—a proportional decline greater than that of the market average.

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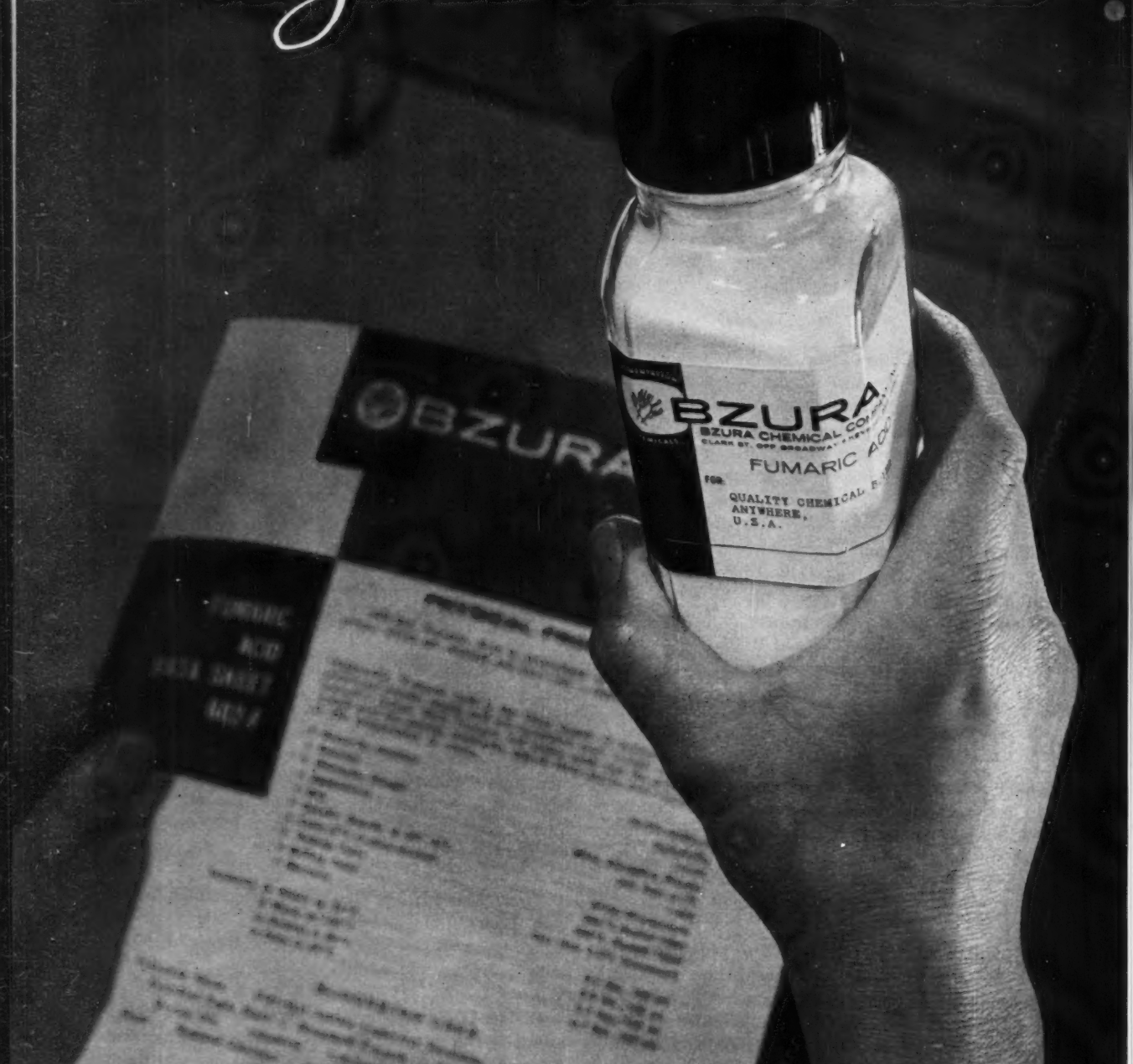

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Newsletter

CHEMICAL WEEK
April 8, 1961

Transition to solid-propellant missiles by the military will be speeded under President Kennedy's overhaul of the defense budget. In the shift away from liquid fuels, the new budget deletes 20 Titan II ICBMs from Air Force production schedules (Aerojet-General is propulsion system contractor).

But the budget expands output of three solid-fuel ballistic missiles — Polaris (Aerojet-General and Hercules), Minuteman (Thiokol, Aerojet and Hercules), and the Skybolt air-to-surface weapon still in development (Aerojet).

The Pentagon's new budget earmarks about $1 billion extra for procurement and R&D contracts than was scheduled by the Eisenhower Administration. But there are other major cutbacks, in addition to Titan II, for projects in which chemical firms figure as key contractors.

Development of the Navy's Eagle air-to-air missiles (Aerojet) is killed, as is the Air Force program to develop an aircraft nuclear propulsion system (GE and Pratt & Whitney). And the Army got a turndown again on its plea to start producing components for the Nike Zeus antimissile system (Thiokol and Grand Central Rocket Co.).

•

Liquid-fueled and nuclear rocket propulsion development got boosts in President Kennedy's new budget for the National Aeronautics and Space Administration. It will increase spending by some $85 million in fiscal '62 and contract letting by $126 million—if Congress approves the new budget. In direct contrast with the Pentagon program, NASA will get no new money for solid-fuel rockets.

Biggest chunk of the new money—some $78 million—will go to speed development of the second-generation C-2 version of the Saturn engine. Aimed at developing the booster by '66, a year ahead of schedule, the big clustered engine will be able to put 22 tons in orbit—more than twice the payload of the C-1 version.

Development of the nuclear-powered program under Project Rover gets a $14-million hike, $4 million in NASA's budget and $10 million for AEC. All told, about $59.5 million is slated for the program in fiscal '62, with new money going primarily to accelerate reactor development and advance turbo pump and nozzle work.

Some $25.6 million is added to the budget to speed development of the Centaur booster, with the first test flight due late this year. A $9.3-million increase in funds is earmarked for the liquid-fueled 1.5-million-lbs.-thrust F-1 engine.

•

The Air Force has declared excess its borane high-energy fuel plant at Model City, N.Y. It's turning the unit over to the General Services Administration for disposal next year. The plant cost $45 million to build

and has a 5-tons/day capacity. Olin Mathieson operated the plant until it was shut down a year ago and is still listed by the Pentagon as plant operator.

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NASA has given the Rand Corp. (Santa Monica, Calif.), a one-year $129,173 contract to define the role of nuclear rockets in the space program. One of the facets of the study will be a cost analysis of nuclear-vs.-chemical rockets.

•

Stricter control over marketing of new drugs has been ordered by the Food and Drug Administration. But the order is modified considerably from the original proposal published by FDA last fall.

Chiefly, the new order requires manufacturers to furnish "adequate" samples of new drugs and their ingredients to permit a tryout of the proposed control test procedure before new-drug applications are made effective. These are to consist mainly of finished dosage forms used in clinical investigations, new-drug ingredients, finished market packages and reference standards used in assay procedures.

The final order reduces substantially the number of samples that would have been required under the original proposal. One of the more important would have forced manufacturers to supply large bulk packages of medicated feeds. FDA Commissioner George P. Larrick said this would have imposed a "heavy, if not impossible, burden on the industry."

Larrick added that the filing of an application for safety clearance may be refused if insufficient samples are submitted, additional samples may be requested by FDA if they are needed, and the marketing of a new drug may be delayed pending verification of controls by FDA.

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Food processors now have 27 extra months to submit safety tests on their additives to the Food and Drug Administration. The necessary legislation, requested by the industry and FDA, has cleared both houses of Congress. It extends to June 30, '64, the deadline for completion of safety tests on chemical food additives. The deadline was March 6, '61. Covered are chemicals in use prior to Jan. 1, '58, and which involve "no undue risk to the public health."

•

A $100-million/year water-pollution control program is the goal of Secretary Abraham A. Ribicoff of Health, Education and Welfare. He told the House Public Works Committee there is a current need for more than 5,000 municipal waste treatment plants, and the present $50-million/year federal grant program is insufficient.

The committee is considering legislation to increase construction grants to $125 million/year for 10 years. There is considerable sentiment in Congress favoring a boost in the program, and something close to the $100 million urged by Ribicoff may finally be approved.

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Dow's 'Leland I. Doan' is latest chemical ship new from keel up.

CPI Returns to the Sea

Belying the 40-50% reduction in domestic chemical deep-sea shipping since '55—as repo ted by the Interstate Commerce Commission and the U.S. Army Corps of Engineers—at least six new vessels will go into chemical service this year.

This large-scale introduction of new chemical tanker capacity represents the biggest increase in nearly a decade.

One factor behind this surge of activity by chemical producers is the realization that ships still best answer one of their big traffic problems: economical movement of large volumes over long distances.

The six-year lull in shipbuilding primarily reflected killing competition from the railroads.

In the face of railroads' selective rate cutting, plus increasing truck and tank-car capacities, deep-sea haulers have been hard-pressed to justify heavy capital outlays. They have seen their labor costs rocket and their repair and replacement bills mount for often-out-moded World War II equipment.

Paradox: Oddly enough, the same areas of competition that led to loss of shipping volume are now responsible for the reverse. Mexican sulfur's growth materially reduced domestic shipping needs. Now sulfur —in molten form—is behind three of the new ships being launched this year.

Another source of renewed shipping activity is the movement of chemicals —both packaged and in bulk—via container-equipment ships.

Increasingly stiff rate competition from Eastern railroads has played an important part in the steady decline of coastwise shipping. Lines such as Pan-Atlantic Steamship Corp., Seatrain Lines, and Luckenbach Steamship Co. have gradually lost business, and Luckenbach actually terminated coastwise service in February.

Now two of the new chemical-hauling vessels will handle both bulk and container-loads of products and another firm—Sea-Land Service, Inc. —reportedly is about to begin movements soon.

The New Ships: Of the six new vessels planned for this year, only one is new from the keel up. All the others are converted T-2 tankers, basic wartime designs that have been modified for many special jobs. Here's the rundown on what's new in deep-sea chemical transporters.

• *Leland I. Doan.* Built for Dow Chemical Co. by Bethlehem Steel, this is the only completely new chemical ship this year. This vessel is already in operation—she took on her first cargo last February at Freeport, Tex. When fully loaded, she will be carrying nearly 3.75-million gal. of chemicals.

With its two other ships—*Marine Chemist* and *Marine Dow Chem*—Dow expects to be able to move more than 600,000 tons of chemicals annually by water. Among the products the new ship can carry are agricultural chemicals, amines, chlorothene, epichlorohydrin, glycerin and tri-

Freeport's 'Louisiana Sulphur' is new to molten sulfur trade.

chloroethylene. Owned and operated by Marine Transport Lines, Inc., the Dow ships have 13 U.S. ports of call, three in Canada and one in the Netherlands.

• *Marine Sulphur Queen.* This is one of three converted T-2 tankers designed expressly for molton sulfur delivery. Also owned and operated by Marine Transport Lines, this ship is already carrying sulfur for Texas Gulf Sulphur Co. from Beaumont, Tex., to Tampa, Fla., Norfolk, Va., Sayreville and Carteret, N.J. (*CW, Jan. 7, p. 55*).

• *Louisiana Sulphur.* A second molten sulfur tanker, this one operated by Global Bulk Transport Corp. for Freeport Sulphur Co., the *Louisiana Sulphur* is moving cargo from Port Sulphur, La., to Tampa, Savannah, Baltimore, Arthur Kill, N.J., Everett, Mass., and Bucksport, Me. Like the other molten sulfur carriers, her capacity is between 14-16,000 tons.

• *Etude.* This molten sulfur carrier is still under conversion in Germany. When launched—about May 15—she will run from Coatzacoalcos, Mexico, to the Atlantic Seabord and Tampa for Pan American Sulphur Co.

• *Carbide Seadrift* and *Carbide Texas City.* When these two ships start operations for Union Carbide—the first in mid-May, the other about November—they will mark the beginning of large-scale bulk moving of polyethylene and vinyl resins (*CW, April 1, p. 31*). In addition to the bulk cargo, the ships will haul acetone, alcohols, acetates and glycols from Texas City, Tex., to Perth Amboy, N.J., and Carteret.

Carbide, incidentally, is one of the few firms that own their ships—many CPI companies prefer to avoid the problems of shipowning by leasing vessels (crew included) from transport services.

The T-2 Story: T-2 tankers, such as the ones converted for molten sulfur and bulk cargo hauling, were once the backbone of America's tanker fleet. About 530 were built during World War II—hasty construction being their main claim to fame. In '52, after a number had split in half, the U.S. Coast Guard and the American Bureau of Shipping ordered owners to put riveted reinforcing bands on them. This, plus new orders on arranging loads, kept the T-2s going without incident until the *Pine Ridge* broke up off Cape Hatteras last December.

Now many of the tankers are being "jumboized," some are being scrapped. Keystone Shipping Co. (Philadelphia), operator of the *Pine Ridge* and other T-2s for Publicker Industries, says now all its tankers are due for "jumboizing"—that is, inserting a new midsection, about 40-60 ft. long—to increase ship capacity without increasing its draft.

Shipping Future: Ship operators are fighting hard to keep their share of chemical movements. But despite the optimism evidenced by current building activity, competition from truck and rail is as keen as ever. Some producers look to jumbo tank cars—20,000-30,000 gal.—as one of the biggest threats to ocean movement. "If jumbo car rates go down, we'll have to think twice before moving our stuff by ship," says one company. One drawback to the larger tank cars, though, is their extreme weight, limiting cargo density.

Another limit to shipping activity is the high cost of construction and conversion. Any improvement here largely depends on the administration's attitude toward construction—not necessarily operation—subsidies, many feel.

Since inter/intracoastal shipping is closed to foreign ships, government subsidy for operating costs is automatically eliminated. Aid for ship construction, on the other hand, is limited only by the builder's conformance to requirements in the Merchant Marine Act of 1936.

Trends in domestic chemical shipping are debatable at best, since even the most accurate tonnage figures are ill-defined as they regard commodities shipped. However, a CHEMICAL WEEK check of the nation's leading chemical firms has disclosed growth in deep-sea hauling ranging from 30% to 1,000%. Not too many companies are breaking into shipping, but those that have already proved deep-sea hauling's advantages for their own operations are moving ahead full-speed.

Rugged New Carboy

A new, 15-gal.-capacity plastic carboy has just begun fighting for a share of small-quantity chemical packaging jobs. It is reportedly the first plastic carboy to win Interstate Commerce Commission approval for use without an overpack.

The new drum-shaped carboy is produced by Plastineers, Inc. (Minneapolis). It is injection-molded in two parts (two large cups, top and bottom), which are joined by a patented process the company terms "fusion welding" (weld area is heated with each half in place).

The new units—available only in 15-gal. sizes initially—will cost $19.95 each in quantities under 15; in larger lots, the price per unit will be $17.95.

Another Copolymer: Plastineers tells CHEMICAL WEEK that it took three years to select the copolymer resin it's using but won't identify the resin, nor will Union Carbide

Progress Report...

— Chemicals for herbicides

— FLEXOL epoxy plasticizer EP-8

Chemicals for 2, 4-D and 2, 4, 5-T herbicides

Several CARBIDE chemicals are useful in the manufacture of 2, 4-D and 2, 4, 5-T acids and in the formulation of esters and salts for their application.

Phenol and acetic acid are the major organic raw materials needed to produce the acids. The practical use of both 2, 4-D and 2, 4, 5-T depends, of course, upon accessory chemicals that permit them to be emulsified, or dissolved in water, for spraying. The relatively high cost of some solubilizing agents and their poor solubilizing efficiency are problems that have been satisfactorily overcome by the use of CARBIDE chemicals.

Ester Formulations...

Isopropanol, isobutanol, and butanol are favored for converting the herbicidal acids to esters. They combine ease of reaction, low cost, low molecular weight, and ready solubility in light hydrocarbons. To minimize the possible hazards of volatility, "low-volatile" esters of 2, 4-D and 2, 4, 5-T are prepared from 2-ethylhexanol or the glycol-ethers, both of which meet Department of Agriculture standards. For general use, esters of butoxyethoxy propanol are favored.

Emulsifiers of these esters may be a mixture of TERGITOL nonionic NPX and cationic amine 220—or oleates based on CARBOWAX polyethylene glycols. With aliphatic hydrocarbon diluents, a coupling agent such as butyl CELLOSOLVE may be required.

Amine Salt Formulations...

Because of the high potency and volatility of 2, 4-D ester formulations, the safer amine salts of 2, 4-D have found wide acceptance. Another advantage of amine salts is that they can be removed easily from spraying equipment merely by rinsing with water.

Among several amines suitable for formulation of liquid concentrates of 2, 4-D, diethanolamine and triethanolamine are the most economical. Both have comparatively low odor, low toxicity, and low volatility. Preparation of the 2, 4-D salts is done by mixing acid and amine in the proper proportions for combining chemically. Our Technical Representatives can furnish you with information on the advantages of CARBIDE chemicals in formulating 2, 4-D and 2, 4, 5-T herbicides.

New epoxy plasticizer replaces costly materials

A new money-saving epoxy plasticizer, FLEXOL EP-8 (2-ethylhexyl epoxy tallate), is now commercially available. Vinyl resin compounders can use it in place of more expensive materials, such as azelate, adipate, and sebacate plasticizers. This new material has exceptionally good flexibility at temperatures as low as 40° F., as well as excellent light and heat stability.

In addition, as an epoxy, FLEXOL EP-8 provides vinyl products with outstanding resistance to heat. At concentrations as low as five parts per hundred in vinyl compounds, it reacts synergistically to give greater opposition to heat degradation than metallic-stabilized vinyl compounds separately.

For low-temperature compounds, FLEXOL EP-8 can be both plasticizer and epoxy stabilizer with low-cost primary plasticizers such as FLEXOL DOP (di-2-ethylhexyl phthalate).

Among the characteristics of vinyl plastisols produced with FLEXOL EP-8 are low viscosity and good viscosity stability. Vinyl film and sheeting made with EP-8 exhibit exceptional hand and drape.

In calendered film and sheeting, coated fabrics, garden hose, electrical insulation, injection-molded or extruded articles—wherever a combination of low-temperature flexibility and heat-light stability for vinyl chloride plastics is required—EP-8 should have particular appeal.

This compound also is suggested for use as a stabilizer for chlorinated rubber and other chlorinated solvents, and as a plasticizer for nitrocellulose and synthetic rubbers.

Physical properties and other information about FLEXOL EP-8—performance, compatibility, and typical analysis—are contained in a technical bulletin now available from your nearest CARBIDE office, or by checking the coupon.

Tear out this coupon. Check the boxes on which you'd like more information, and mail to Dept. H, Union Carbide Chemicals Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y.

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Plastics Co., its producer. But Plastineers does say that it adds carbon black to the resin to reduce ultraviolet-light degradation.

The company expects to achieve full production—some 5,000 units/month—within a month. Other sizes may be available later on special order.

The new carboy's wall thickness is a uniform ⅝ in. throughout most of the cylindrical portion; curved portions are a little thinner, except in reinforced areas, where 1-in. thicknesses are found. The carboy weighs 17 lbs. empty, is 20½ in. long, 17¼ in. in diameter.

Acids and Beer: Plastineers sees some diverse markets for its new carboy. It believes many shippers of acids will turn to the drum to avoid the expense and bother of using the protective overpacks required with other plastic carboys or the standard glass models. And the company is banking on relatively easy handling characteristics of the new carboy (it has standard-size polyethylene openings, can be used with a standard polyethylene pump) to win new uses. It hopes brewers will switch to its new plastic package for beer shipments.

Selling Instant Money

During the past several weeks, Union Carbide Chemicals Co. (New York) has kicked off a bid for increased fluorocarbon refrigerants sales. Its weapon: virtually "instant refunds" on gas cylinders to wholesalers and their customers.

So far, Carbide and its one sales agent, Ansul Chemical Co. (Marinette, Wis.) say the plan has boosted refrigerants sales and has speeded use of gas cylinders. And Carbide is betting that the new plan will win favor among refrigerants wholesalers by providing them with a method for controlling their accounts receivable more closely.

How It Works: When Carbide ships a load of cylinders (10-, 25- or 145-lb. sizes) to a customer, an envelope —with a check imprinted on its face —is attached to the bill of lading. Then, when the customer has used the fluorocarbon materials and is ready to return the empties, he merely writes himself a check for the amount of the deposit he previously paid and deposits it in his bank account.

Carbide points out that its 600

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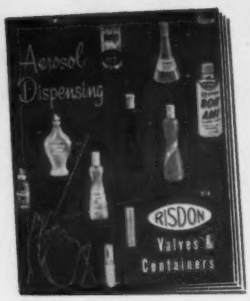

Via RISDON

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Includes details on Risdon's GB Valve, Micro-Mist™ Valve, small and large capacity metering valves, 5210 Valve, special actuators and on Risdon's line of complete aerosol-dispensing containers. Actual size illustrations show the Mini-Mist™ and Vaniti-Mist™ refillable containers and the Handi-Mist™ non-refillable package.

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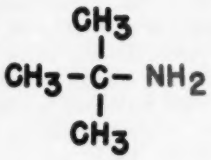
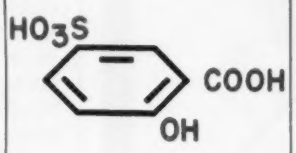


A low-viscosity, oil-soluble liquid, *t*-butylamine cleanly undergoes reaction to give high yields of Schiff bases, quarternary and ordinary salts, cyanamides, acetonitriles, propionitriles and others.

The branched chain of *t*-butylamine acts as a "reaction-regulator"—aids in controlling specific replacement either of one or of both amino hydrogens. Monosubstitution takes place easily. Under mild reaction conditions, with one mole of ethylene oxide, only traces of the di-hydroxyethylated amine are produced.

Many *t*-butylamine derivatives (aldimines, carbodiimides) possess unusually high stability compared with common primary amine derivatives.

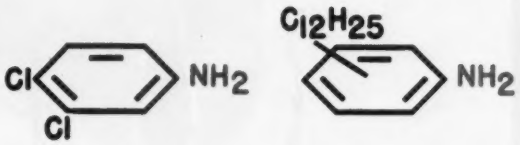
5-SULFOSALICYLIC ACID



Trifunctional 5-sulfosalicylic acid is a new and highly reactive Monsanto intermediate now commercially available for your evaluation. A tan crystalline material, this strong aromatic acid has a neutralization equivalent of 107-114. It gives you three reaction sites for creative synthesis.

Because of the apparent hydrogen bonding potential of its reactive groups, 5-sulfosalicylic acid offers promise as a chelating agent for metals. It is already at work as an analytical reagent for use in the determination of various metals and to detect various types of proteins.

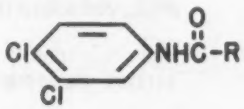
3,4-DICHLOROANILINE & DODECYLANILINE



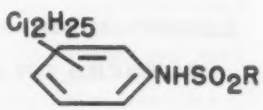
These highly reactive compounds convert readily with good yields by reactions of the amino group. They provide direct routes to unique isocyanates, sulfenamides, ureas, Schiff bases, anilides, aromatic ethanolamines and similar products.

Examples:

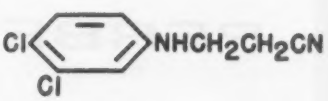
With acylating agents



With sulfonyl chlorides



With acrylonitrile



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LUCIDOL DIVISION

WALLACE & TIERNAN INC.
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BUFFALO 5, NEW YORK

fluorocarbon refrigerants wholesalers average something like $200/order in cylinder deposits, although some range upward to $1,000. Under the "instant money" plan, the company feels it can release this cash to them more promptly.

Some refrigerants producers feel the new plan will not give an edge to Carbide. They feel it offers too many temptations for writing exorbitant checks.

But Carbide says it has installed suitable safety factors in its system. For one thing, all cylinder-deposit checks come out of a separate Carbide bank account—one that's presumably kept low enough to foil any attempt to make big money in a hurry. Furthermore, Carbide contends that improper check totals are spotted easily, because the wholesaler must enclose a copy of the bill of lading in the envelope on which the check is imprinted. And the company points out that the carrier accepting the cylinder for return shipment must sign the bill of lading before the check is complete.

It may be several months before fluorocarbon refrigerants producers can fully assess Carbide's move. But it's a good bet that Carbide has gained at least a little of attention and interest—two powerful sales factors—with its program.

Chemical War Guide

A new book on chemical warfare —"The Chemical Warfare Service: From Laboratory to Field"—has just been published by the U.S. Defense Dept. It is the latest in a series on the U.S. Army in World War II. (Cost: $3.50; Supt. of Documents, Government Printing Office, Washington 25, D.C.).

It covers the history of research, development, procurement and distribution of Army chemical warfare materiel, details many of the problems encountered since the war. Moreover, it reveals some surprising facts about chemical warfare. For example, it reports that the U.S. Army was unaware of the German development of nerve gases until after the war ended, points out that none of the reagents in detector kits or devices was fast or reliable enough to warn fighting men of the presence of nerve gases.

More Hawaii Cement

Bustling Hawaii is becoming self-sufficient in another CPI product — cement. What are expected to be the last shipments from the U.S. West Coast arrived in the new state late last month. Hawaii's two main cement producing companies, Hawaiian Cement Co. and Permanente Cement Co., will now supply essentially all the state's needs, and then some.

Behind the shift: difficulties in getting clearance from the federal government. The two firms opened their plants in '60 with enough capacity to satisfy twice the current consumption, so there's been no lack of productive capacity since that time. But both units were forced to shut down last fall for lack of federal inspection facilities. To satisfy the burgeoning Hawaiian construction market, large quantities of California cement were imported.

Now California cement makers, looking elsewhere to market some of their product, may find Hawaiian cement marketers bidding for some of the same orders.

DATA DIGEST

- **Polyethylene Catalyst:** Technical bulletin outlines specifications, properties and handling data for substituted diperoxide catalyst for cross-linking linear polyethylene. Lucidol Division, Wallace & Tiernan Inc. (1740 Military Rd., Buffalo 5, N.Y.).
- **Fluorocarbon Products:** Brochure (9572) describes chemical, physical, electrical and mechanical properties of products—tubing, sheets, bearings, etc.—made from reinforced fluorocarbon resin. Plastics Division, Dixon Corp. (Bristol, R.I.).
- **Plasticizers:** New 49-page bulletin (No. PL-306) lists specifications and physical properties of inert, chlorinated biphenyls and polyphenyls, as fortifying extenders and plasticizers. Applications: vinyl resins, elastomers, cellulosics, polyesters, epoxies, etc. Organic Chemicals Division, Monsanto Chemical Co. (St. Louis 66, Mo.).
- **Packaging Code:** Government publication (Military Standard 726, $1.25) outlines system of coding packaging data when required in a government contract. Supt. of Documents, Government Printing Office (Washington 25, D.C.).

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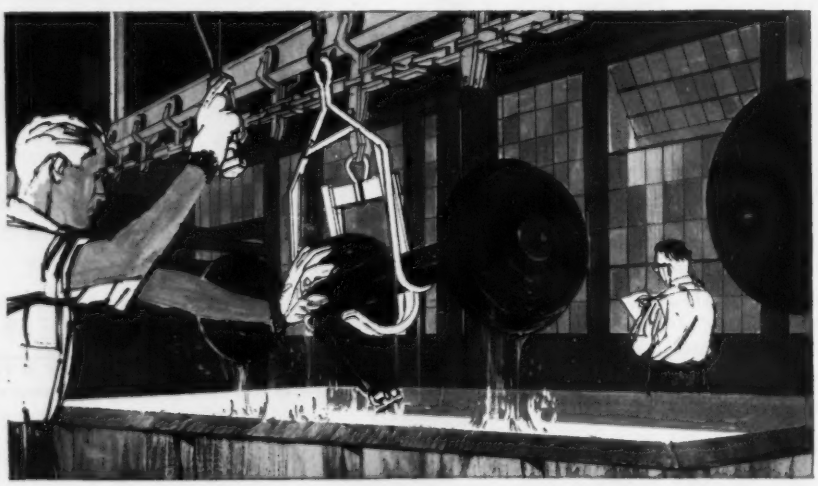
Armour Industrial Chemical Company has done much of the basic research and development with cationic emulsifiers. The following are typical applications.

METAL CLEANING. Arquad 2C and Ethomeen S/12, when mixed with kerosene and 20% phosphoric acid solution, clean greasy machinery and parts in a jiffy. This same cationic substantivity of Armour chemicals permits better oil deposition onto metal surfaces to improve corrosion-resistance during shipping and storage. And, as a paint-finish remover, a solution of 10% sodium hydroxide and 0.5% Ethomeen C/25 acts twice as fast as a 25% caustic solution.



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SURFACE MAINTENANCE. Cationics such as Ethomeen T/12 and Armac® T chemicals produce oil and wax emulsions of a fine-particle size that rapidly exhaust onto fibers, glass, masonry, metals and plastics. When dust mops, for example, are immersed into a cationic emulsion, the oil exhausts completely from the emulsion onto the strands of the mop. Furthermore, cationic emulsifiable concentrates are easily prepared for water dilution by the ultimate user.

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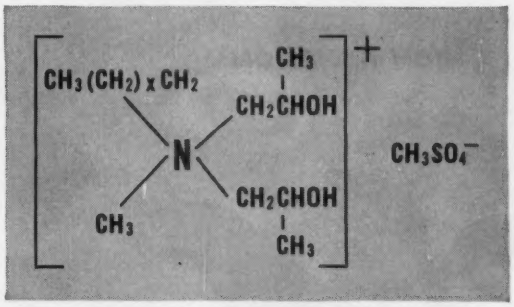

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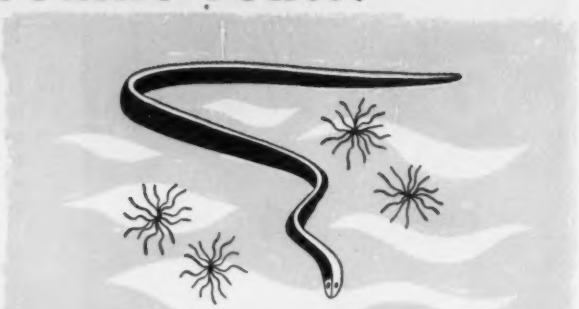

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The oxazoline structure is unique among waxes, both natural and synthetic. From it comes *high adhesion, good wetting on hard surfaces* and *good lubricity. These waxes are compatible with most natural and synthetic waxes.* Stable gels or pastes are formed when they are dissolved in high concentrations in many organic liquids.

Because of these properties, TX-1 and TS-254 are expected to be useful in self-polishing floor waxes, paste polishes, leather, paper, and textile finishes, synthetic lubricants, metalworking lubricants, cosmetics, as mar-proofing agents in enamels, and as pigment grinding assistants.

There are four other oxazoline waxes also available. Let us discuss your specific problem and provide you with samples. Write on your letterhead to Market Development Department, Commercial Solvents Corporation, 260 Madison Avenue, New York 16, New York.

PHYSICAL PROPERTIES	TS-254	TX-1	ES-254	TS-254A	TS-254AA	TS-970
Melting point °C	63	160	37	50	93	74
Volume Expansion on melting—%	7.7	—	8.9	9.2	9.2	9.1
Penetration, ms/100 gm. load (ASTM D5-25)	0.2	—	1.3	0.3	0.4	0.1
Acid No. (approx.)	7	12	9	2	1-2	6
Solubility, % by wt. in:						
Butanol	7	49	50	22	13	4
Toluene	16	52	49	16	7	16
Carbon Tetrachloride	16	47	49	gel	14	gel
Stoddard Solvent	12	52	49	17	4	5
Butyl Acetate	11	55	49	13	9	6
Methyl Isobutyl Ketone	10	ins.	49	10	8	5
Turpentine	21	10	24	21	10	10

COMMERCIAL SOLVENTS CORPORATION

CSC

Punching in at Rhone Poulenc. Throughout Europe, labor is pressing for—and winning—higher wages.

European Labor Raises the Ante

With Europe's chemical industry booming—and labor in short supply—European unions are making a spirited bid for a bigger share of the general prosperity.

While European chemical producers delight in the explosive growth of their booming new markets, they also wrinkle their brows at what comes with it as both cause and effect: the "labor problem." Fueling a large part of this growth is new consumer spending; but part and parcel of this spending, they are finding, are bigger wage demands, higher labor costs (*see table, p. 42*). And hand in hand with industrial expansion comes the problem of an ever-tightening supply of labor.

Even if Europe's industrial boom levels off a bit this year, these forces will be at work, gradually changing the climate of industrial relations.

The labor supply is, of course, one of the primary factors behind Europe's spiraling labor costs. In several of the Common Market countries — Germany, the Netherlands and Luxemburg—manpower reserves are virtually exhausted, while in Italy and parts of the U.K. there is still a sizable unemployment problem. But other factors — such as government labor policy, economic growth, and the strength of unions—also play a varying role throughout Europe, so that the over-all pattern in labor costs is a mottled one. But one trend is clear: labor costs are going up, and faster than they are in the U.S.

Since World War II, wages in the Common Market have been rising an

average 8%/year, compared with the 5% annual growth in the U.S. For industry as a whole, French wages have risen the sharpest—up 139% in the '50-'59 decade. German wages were up 91%; British, 77%; Swedish, 100%. With adjustments for inflation, however, Germany shows the greatest gain—58%, compared with 43% for France.

Within the chemical industry, German wage costs again have risen most, as shown by a comparison (*table*) of what happened in the five biggest European producing countries (Germany, France, Italy, the Netherlands and the U.K.) between Oct. '57 and April '59—the period covered by the best study* to date on the subject.

Not Enough Workers: The impact of the labor shortage is most clearly seen in Germany, where chemical industry wages rose about 40% during the last five years, while working hours were chopped from 48/week in '56 to 44 hours in the summer of '60—with each reduction granted at full pay.

But government can be more important than labor supply in determining wages. The Netherlands offers a good example. Between Nov. '57 and April '59, Dutch chemical industry wages rose only about 3.8%—the smallest rise of the major European producers. Under a '45 decree, the government followed a planned wage policy, which linked wage increases throughout all sectors of commerce and industry. This policy was made more flexible in '59, but the government still has the last word on wage increases, and approval still depends on the increase not having an inflationary effect.

Actually, it's impossible to compare European countries' labor costs with a great degree of accuracy. That's because social charges (fringe benefits) figure so heavily in European labor costs, and the label covers different things in each country. The best studies on the subject, such as the one on which the chart (*above*) is based, try to take these differences into account, but rely in part on estimates.

The importance of fringe benefits in industry varies widely from country to country in Europe, ranging (in April '59) from about 71.5% of total hourly wage costs in Italy to only about 14% in Great Britain. In the U.S., the average is in the neighborhood of 20%.

British unions have never put great stress on fringe benefits. Most chemical companies have long had pension and sick-pay plans (which have usually been initiated by the employers).

On the other end of the scale, Italy's wages are among the lowest in Western Europe, and its fringe benefits are probably the highest. In addition to wages, employers have to contribute to family allowances, health insurance, severance pay, pensions, etc. There is a fund for constructing workers' houses, to which companies contribute 1.1% of their workers' wages (the workers contribute 0.53%). And in addition to vacation pay, workers get a Christmas bonus of 200 hours pay, and usually another bonus either at Easter or the August holidays.

Whetted Appetites: It's clear that with European business booming and with the relatively fat paycheck of the U.S. worker in plain view, European workers won't be content with the gains they've already made. (U.S. chemical workers average about $3/-hour, compared with 83¢/hour in Germany.)

The pressure may rise the most dramatically in Italy. Ten years ago, the Italian worker was happy if he had a radio. Now he wants a TV set, an icebox, a washing machine. But he's still lucky if he earns enough to meet his family's basic needs.

Italian unions complain that the Italian industrialist is among the least "enlightened" in Europe. Among their complaints: although the biggest Italian chemical firms have seen an increase in productivity of 30-35% since '58, their productivity bonuses are at a standstill. Montecatini's, for example, has been stationary at 12% for the last five or six years.

Later this year, the '58 National Contract of the Italian chemical industry will expire, giving the unions a chance to press new demands. Higher wages will probably be on top of their list. The unions are expected to bid for a boost in the national minimum wage, a cut in the number of geographic wage zones and in the size of the differentials between them, and for equal pay for women, who comprise 40% of the chemical industry's labor force.

Hourly Chemical Wages

	Oct. '57	April '59
U.K.	78¢	80¢
W. Germany	72¢	83¢
Italy	66¢	71¢
Belgium	n.a.	76¢
France[1]	66¢	77¢
Netherlands	55¢	57¢
U.S.	$2.85	$3.03

[1] Figures for both years converted at '59 rate of 490 francs/$1.

The Italian unions also want productivity bonuses to more closely follow actual increases in productivity, and they want them to be stipulated in the National Contract, instead of merely being suggested.

Also on the list: a cut in working hours, mostly through more holidays, especially where the work is harmful to health. And the unions will press for rules bringing the Italian industry up to the standards of the rest of Europe in protecting workers from such health hazards as contact with harmful chemicals.

Elsewhere in Europe, there is, of course, continuing demands for higher hourly rates. But other demands will be receiving as much emphasis.

Top item on the French unions' list of grievances is the country's present zone system of wages, which results in at least five different wage scales for each category of work. The unions want uniform national wages as badly as they want higher wages. They also want job classifications upgraded to take into account the increased responsibilities and tensions that have accompanied automation. They want the labor force increased, and the work week cut progressively to 40 hours with no loss in the overtime pay now earned for working over 40 hours. (This would mean a 25% increase in earnings.) Until then, they are asking for premium pay for night work. Finally, they want a fourth week of paid vacation, as salaried employees get now.

These goals French union leaders hope to win on the national level. For the moment they're leaving the questions of actual wage increases to be settled on a company basis.

Along with their successful push

* By the French National Institute of Statistics and Economic Studies.

WHAT'S NEWS IN ENJAY TECHNICAL SERVICE

Enjay helps reduce cost of 90°C vinyl wire insulation...

An important part of Enjay Technical Service is developing useful new products that reduce costs, yet maintain performance. Ditridecyl phthalate for use in plasticizing vinyl wire insulation is a good example of this research activity. By tests, such as the oven aging shown above, Enjay was able to prove that DTDP, made from Enjay tridecyl alcohol, performs as an efficient, non-volatile plasticizer for 90°C wire — yet reduces plasticizer cost. Test results, at right, show that the insulation exceeds the U.L. Specifications.

Enjay research facilities and technical skills are available to customers in the vinyl wire, film and sheeting industries.

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	U.L. Specification Minimum	DTDP Plasticizer
Elongation	65% retention	100% retention
Tensile Strength	65% retention	101% retention
Dielectric Strength	50% retention	127% retention
Insulation Resistance*	.01 megohm based on 1000 ft.	0.36 megohm based on 1000 ft.

* 1 day and 7 days @ 113°C.

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for higher wages, the German unions have also successfully pressed for shorter hours. In February they won a new industry-wide agreement to increase basic vacations from 12 to 15 days, which means workers are entitled to vacations of up to 20 days, depending on age. Next January, vacations will again be increased to a range of 18 to 22 days.

At the same time, it was agreed to keep the present 44-hour work week in force until the end of '63, then to cut it to 42.5 hours without cutting pay.

British unions have also been asking for a cut in working time. Until last year the work week since World War II had remained at about 44-45 hours. The unions started their drive for a cut to 40 hours in '59, and a year ago won a compromise cut in the chemical industry to 42 hours.

Earlier this year the British chemical industry employers association turned down the unions' request for a standard three-week vacation. That issue isn't dead. Meanwhile, the unions did win a small gain this year—time-and-a-half pay for shift workers between 6 a.m. and 2 p.m. Saturdays.

Shaky Front: As they push for more gains, Europe's chemical unions will have on their side the pressure of a manpower shortage and the healthy condition of chemical company coffers.

But they are also struggling against many of the disadvantages that have limited their success in the past.

Politically, European labor unions often make a lot of noise, cause a lot of trouble and exert a lot of influence. But as collective bargaining agents, they are generally weak, compared with unions in the U.S. The reasons are manifold.

A big part of their problem is often that they are too small and poor to be very effective. This is especially true in Italy and France, where, respectively, only about 35% and 20-25% of organizable workers are union members. Behind this scanty showing is difficulty of persuading hard-pressed workers that membership is worth scraping up dues. In Italy, half of the relatively few workers who do join the union don't pay their dues.

Because they are weak, European unions cannot accomplish much for the workers; and because they do not accomplish much, they find it hard to attract new members.

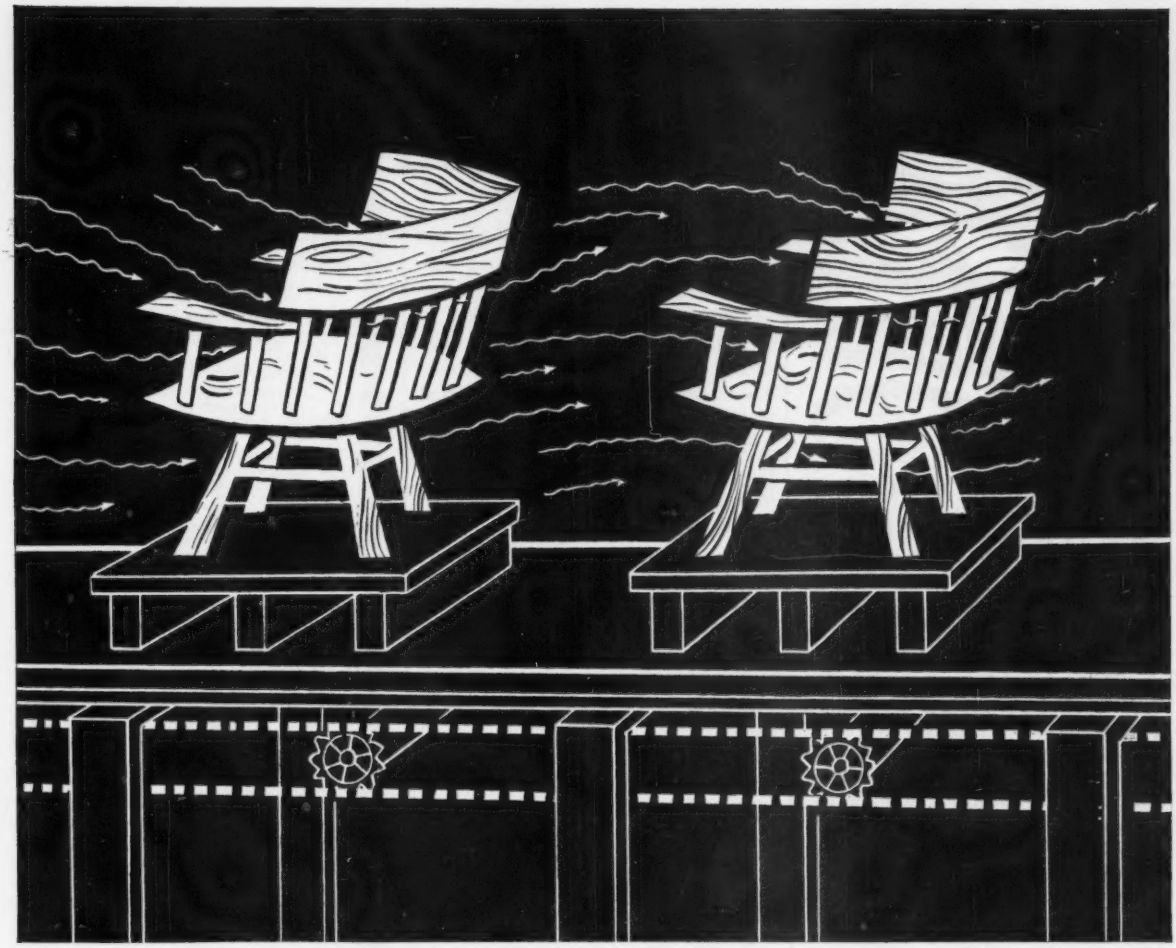
And the vicious cycle goes on. Lacking strength, most European unions have aligned themselves with political parties, hoping to win with political pressure what they couldn't win at the bargaining table. On the Continent this has resulted in debilitating fragmentation along politico-religious lines — Catholic, Christian Democrat, Socialist, Communist, Republican, Liberal, etc. Italy, for example, has three unions in the chemical industry associated with the Socialist and Communist parties, the Christian Democrats, and the Social Democrat and Republican parties. France has three important national labor unions and a fourth for technicians, supervisors, and foremen; the chemical industry deals with all four, as well as a group of independent unions.

Another factor which has weakened European unions is the general practice of industry-wide bargaining. Generally, minimums for wages and fringe benefits and standards for working conditions are negotiated on a national or state level by committees representing the employer association and the unions within a specific industry. The realities of the labor market have prompted most companies to pay above the minimum levels, but because there is generally no bargaining at the plant or company level, a lot of leverage has been kept out of the unions' hands.

And Europe doesn't have union shops—unions vie for proportional representation within each plant, dividing up what little influence they can exert. In Italy, the situation is even more extreme: unions are represented within the plants by dues collectors, "activists," etc., but employers do not recognize their right to function as an organization within the plant.

In fact, not until the past year did Italy have law-enforcing labor contracts, giving collective bargaining legal status.

A trend away from industry-wide bargaining has been developing. In France, Pechiney, St. Gobain, Ugine, and Rhone-Poulenc have all adopted plant agreements. In England, impatience with the lack of aggressiveness on the part of the national



How to cool off a hot seat

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Ethyl	565	1.27	245°F	Soluble
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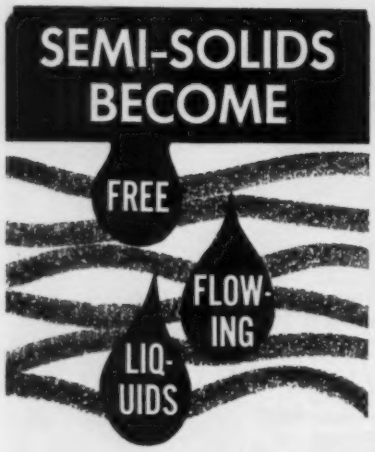

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unions has led to an increasing amount of trouble from the "shop steward movement," as plant leaders demand more militant action and take matters into their own hands. Last year Britain was hit by a record number of work stoppages—2,814—although no major strikes were officially recognized by the national unions.

Traditionally, British unions have shown discipline, with orders coming down from the top, and national leaders able to insure that national agreements would be lived up to. Now they may be heading toward reorganization and more local militancy.

The relative ineffectuality of Europe's labor unions also stems from the traditional relationship between employee and employer—a sense of class position and cooperation which runs all the way back to medieval times. Although it hasn't been lavish with wages, European management has taken a more paternalistic attitude toward its workers, has provided more fringe benefits, such as housing. Thus, while modern Socialism was born in Europe and has left its political imprint there, the sense of conflict between worker and owner has probably found much sharper definitions in the U.S.

Changing Patterns: As the face of European industry changes in this period of massive investment and mass buying, the tone and structure of labor relations will change too. But it will probably be a long time before there is any real equality of wages.

The Common Market concept includes the idea of a free flow of labor, which theoretically should lead to more uniform conditions. But although the legal bars are coming down, capital has proved more mobile than labor. (Most workers who leave areas of high unemployment such as Italy eventually return.)

The pull of investment to low-labor-cost areas will help level wages, especially when induced by local government concessions such as tax breaks. That, too, seems a long-term process, particularly for industries like the chemical industry, where labor costs have been playing a relatively small part in investment decisions.

But even though wide variations may persist from area to area, labor costs throughout Europe are obviously going up.

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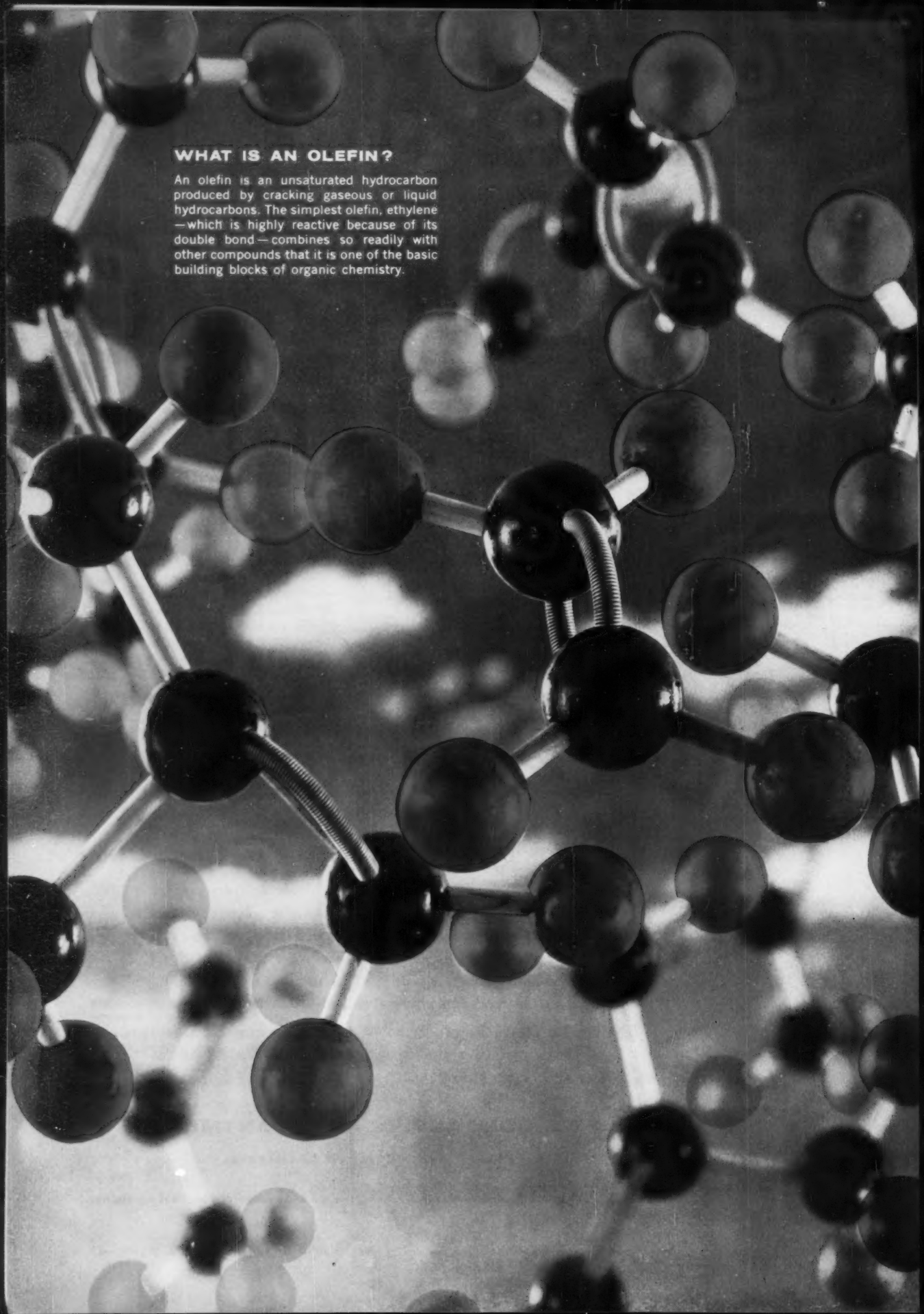

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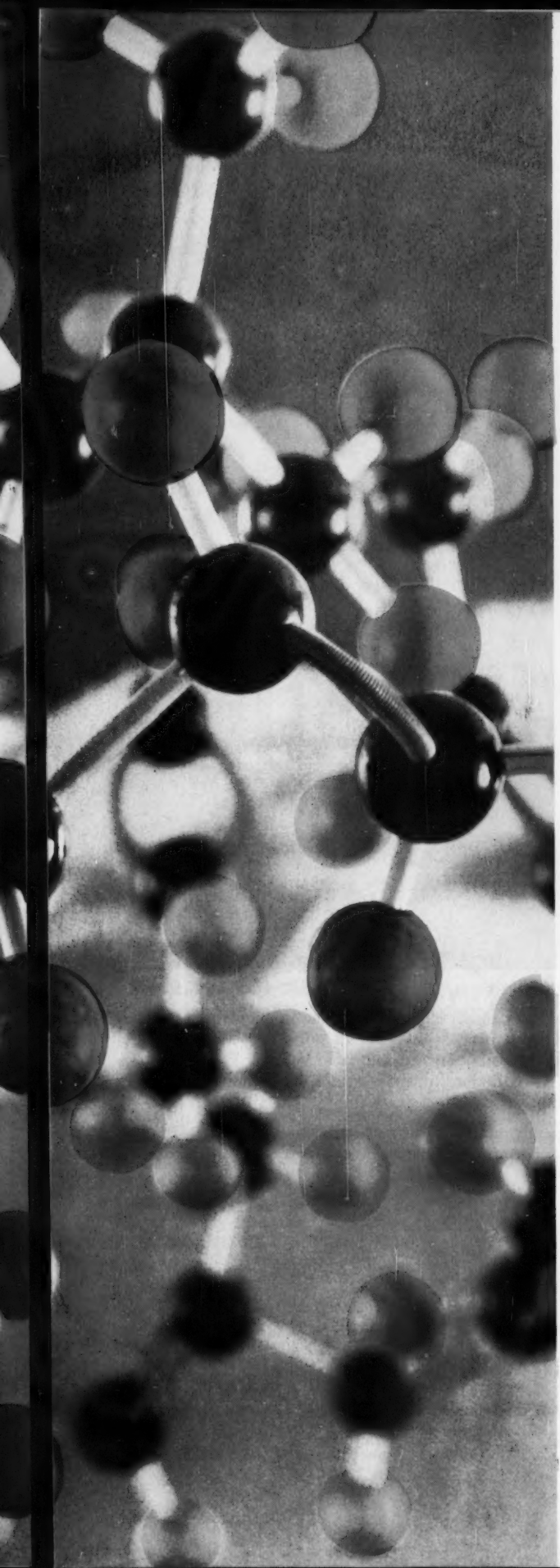

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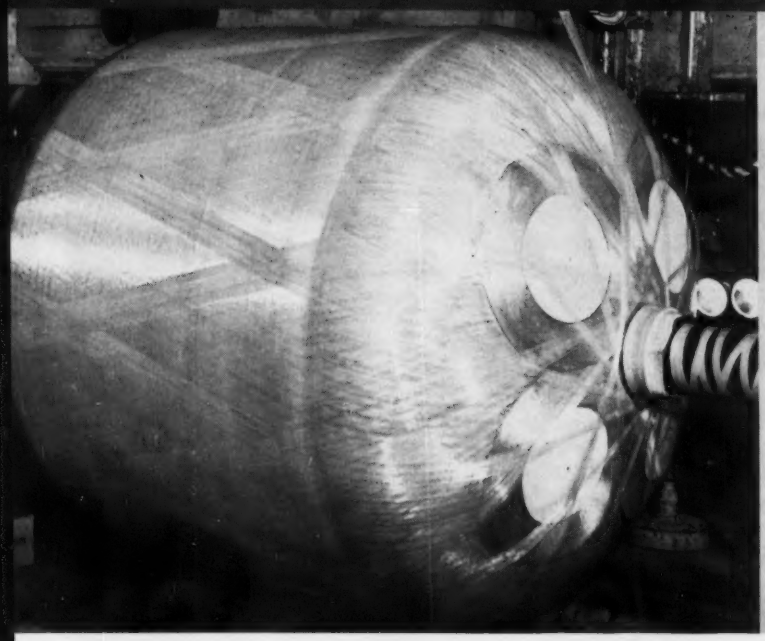

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In the Wrapper, a New Match for Metals

The Society of Aerospace Material and Process Engineers held a three-day conference on filament winding in Pasadena, Calif., last week. And the chemical process industries eyed the proceedings with more than passing interest. The properties that make filament winding attractive for rocket casings (above) are sparking interest in its possible use as a construction material for chemical process equipment.

Filament-wound, glass fiber-reinforced plastics might substitute for higher-priced metals and alloys.

Most fabricators thus far have been too busy with rocket casings to attempt to develop a process industries market. But this situation is now beginning to change. Just one week before the Pasadena conference, Brunswick Corp. reported it had set up an Industrial Products Division at Muskegon, Mich. Aim: to develop industrial applications for reinforced plastics, including filament-wound tanks, vats and exhaust-system ducting.

About a month ago, Black, Sivalls & Bryson (Kansas City, Mo.) completed a new plant at Ardmore, Okla., with side-by-side facilities for turning out production quantities of rocket casings and epoxy resin-bonded, filament-wound, glass-fiber tanks for the process industries. The tanks are 10 and 12 ft. in diameter, 8, 15 and 20 ft. high, cylindrical in shape. Fabricating techniques are highly automated, directed by punched-tape specifications.

Justin Enterprises (Cincinnati) recently reported it is fabricating 6- and 8-ft. diameter (1,000 and 2,000 gal.) spherical tanks using filament-wound glass fiber with a bisphenol-A polyester resin that is said to have greater corrosion resistance than general-purpose polyesters.

In the piping field, Amercoat Corp. (South Gate, Calif.) has been making filament-wound pipe for about three years. Spiral-Glas Pipe Co. (Old Bridge, N.J.) is in pilot production using Enjay's Buton resin instead of polyesters and the more-expensive epoxies (*CW, Feb. 20, '60, p. 108*). Spiral-Glas hopes to be in commercial production by early next year. And several companies (e.g., Roskear Engineering, Thompsonville, Conn.; Minnesota Mining and Manufacturing Co., St. Paul; Haveg Industries, Wilmington, Del.; Ed Conley Plastic Co., Tulsa, Okla.) reportedly are at various stages of development—some employing tape wrapping, which is actually a form of filament winding.

Strength Through Winding: In the most commonly used winding technique, glass roving (unwoven filaments) is fed from a spool through an impregnating resin bath, then wound onto a mandrel. In other techniques, preimpregnated roving is fed through a softening oven and onto a mandrel (or fed directly onto a heated mandrel); or dry roving is wound onto a mandrel and the resin applied thereafter. Theoretically all the filaments are under pure tensile load, the winding supplies the strength and resin is not required.

In practice, however, the greatest strength results from a structure that contains about 20% resin (by weight) and 80% glass. According to Richard E. Young of Hercules Powder Co.,

each filament may not be under equal tension, or there may be some imperfections in the filaments. In either case, strength is reduced.

The resin has the effect of shortening the length of the filaments, distributing the stress, increasing the strength. And, according to Young, the resin increases elasticity; the glass tends to be brittle. Epoxy resins, which have greater elasticity than polyesters, have increased the strength of filament-wound structures from about 100,000-psi. tensile strength to 150,000 psi. and higher.

To get maximum strength the glass roving must be untwisted—in a form that lies flat. Woven tapes do not provide this maximum strength, although some reports on pipe testing indicate that the difference in strength is difficult to detect in field use.

Ahead of Needs: Young began working on filament-wound structures about 14 years ago under a consulting contract with M. W. Kellogg. The work was for the Bureau of Ordnance, aimed at developing a strong, lightweight pressure vessel. Young Development Laboratories (Rocky Hill, N.J.) produced the first test specimens about 12 years ago. "The technique was ahead of requirements at the time," says Young.

But the need arose when rockets gained prominence. And Hercules, which was doing related work at its Allegany Ballistics Laboratory, acquired Young's firm two years ago. Young holds a patent on the helical winding pattern and process for the filament-wound structural material, called Spiralloy (*see cartoon, below*).

The single-circuit winding pattern, used by the string industry for years, is not covered by Young's patent. But beyond that the patent situation is unclear. So far, Amercoat and Black, Sivalls & Bryson have obtained licenses from Hercules, which is also out to develop industrial applications. Spiral-Glas, which began working in the field about 12 years ago, has its own patent on a continuous process for winding vertically.

Others (e.g., Brunswick) hold patents and have applied for patents. Added complication: filament winding is basically a simple technique, which makes it easy for fly-by-nighters to set up. Most firms with experience—Narmco Industries, Zenith Plastics, Lamtex Industries and Apex Reinforced Plastics Division of White Sewing Machine—have had little or no experience outside the military.

Process Industry Needs: While rocket industry needs have pushed filament-winding developments ahead rapidly, the chemical industry has been cautious so far. For one thing, rocket requirements may call for high strength and performance, but the rocket casing has a relatively short life. The process industries' use requires performance over a long period of time. The failure of a pipeline or tank may be much more disastrous than a failure on the launching pad.

Filament-wound structures have high tensile strength. But compressive strength (about 70,000 psi.) and bearing strength (35,000 psi.) are only moderate. Interlaminar shear strength (average: 3,000 psi.) is low. And physical properties are limited by the resins used. (Present temperature range: 300-500 F.)

Rocket casings can be insulated; but insulating the filament-wound structure adds to cost. Chemical companies—e.g., Dow and Union Carbide Plastics—have been working on resins of greater temperature resistance. Special fillers and insulating materials (Raybestos-Manhattan, H. I. Thompson Fiber Glas Co. and Avco are among those that have been working in this field) can increase temperature range to 700-1000 F—but at high cost.

And the glass fibers and resins must resist chemical attack, which becomes more severe at higher temperatures. (Distilled water is considered the most serious attacker of the glass fibers, particularly at temperatures above 200 F.) Water can cause the fibers to swell and eventually fracture. (The epoxy, or other resin, used for lining and coating, must guard the fiber.)

Another problem: developing standard test methods of evaluating ma-

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By Schulz
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OH THE CLOSURE RING CONNECTS TO THE SPIRALLOY... AND THE SPIRALLOY CONNECTS TO THE FORWARD FLAP?
THE FORWARD FLAP CONNECTS TO THE BACK FLAP AND THE BACK FLAP CONNECTS TO THE STOVE PIPE
OH, THE STOVE PIPE CONNECTS TO THE NOZZLE PORT...
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Proof of filament winding's (in this case, Hercules' Spiralloy) acceptance in rocket construction is pointed up in cartoon.

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terials and process variables for filament-wound structures. The Naval Ordnance Laboratory has done considerable work in this area (*CW Technology Newsletter, March 18*), proposed a set of test methods at last week's Pasadena meeting.

In general the process industries have limited filament-wound equipment to low-pressure (about 100 psi.) and low-temperature (200-350 F) applications. For example, BS&B's tanks and Amercoat's piping were first used in oil field service.

Competitive Cost: The cost of filament-wound equipment is difficult to pin down because the type of construction can vary widely, depending on the application. The cost most often mentioned is about $2/lb. This precludes competition with carbon steel, which costs about one-third or one-quarter of that amount. But filament winding can compete in the alloy and specialty lining area (e.g., brick-lined tanks would cost about five times as much).

In one example, a fabricator says that a filament-wound, ¼-in.-thick tank for low-pressure (below 100 psi.) service would cost about $3.50/sq.ft. A comparable stainless-steel tank might cost about $18/sq.ft.

And the cost of shipping and erecting a filament-wound tank would probably be considerably less, based on weight alone. For example, a 12x 20-ft. tank made by BS&B weighs about 1,600 lbs.; a steel tank about 8,000 lbs.

One reason why acceptance of filament-wound equipment may be slow in the CPI: it must compete with less-expensive conventional glass-cloth and mat-reinforced plastic construction. But there is no competition between the two when it comes to physical properties. A conventional laminate with 30-40% resin (by weight) has only about 25% of the tensile strength, about 75% of the compressive strength, about 50% of the flexural strength and about 80% of the bearing strength of filament-wound material.

Glass-fiber, filament-wound structures seem to have a long road to travel in gaining wide application in the chemical industries. But with the military pushing for improvements, the chemical industries could find many potential applications materializing sooner than expected.

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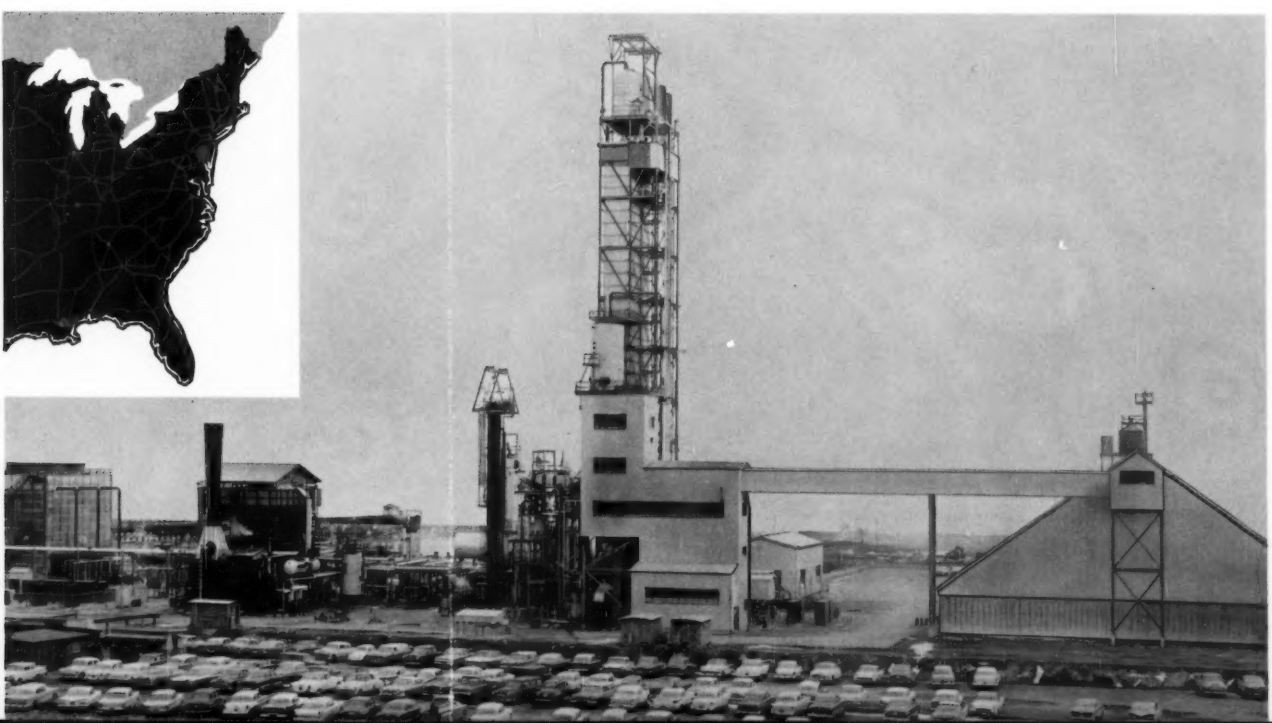

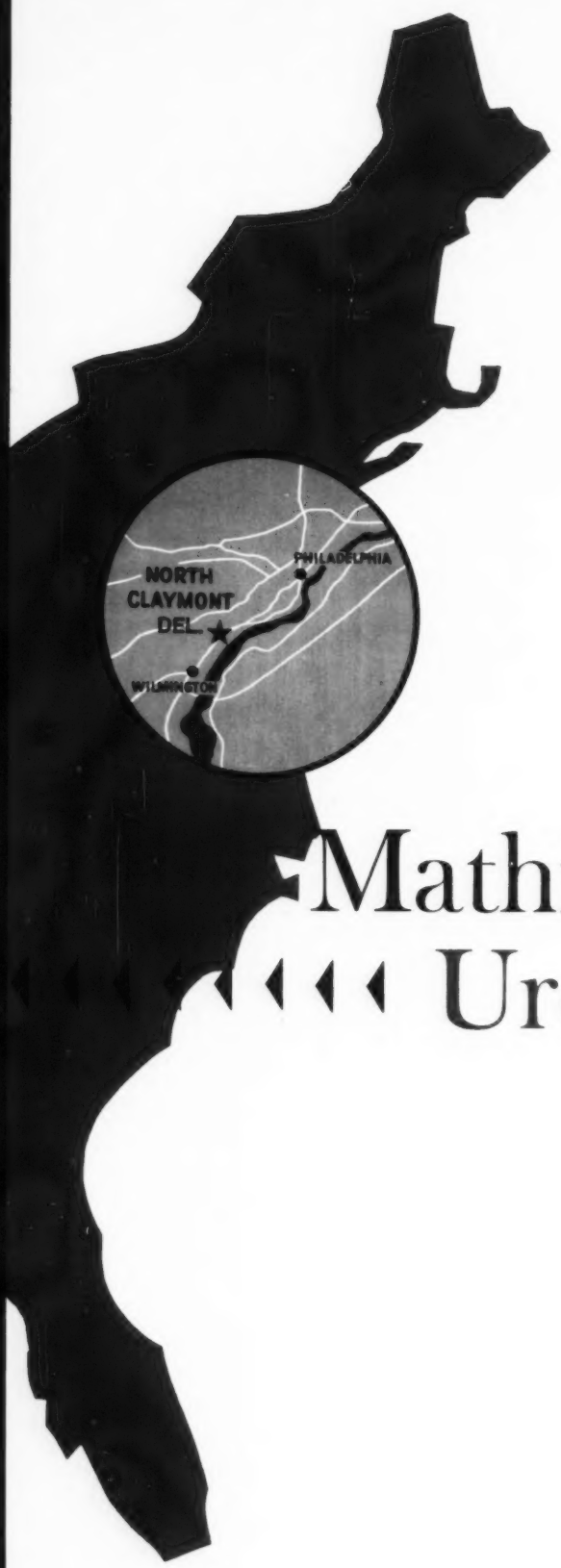

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CHEMICAL WEEK
April 8, 1961

Access to East Germany's chemical technology is provided by a recent agreement between Limex, an East German state trading corporation, and Humphreys & Glasgow, Ltd., contracting engineering firm whose North American headquarters are in Don Mills, Ont. Most of the country's chemical developments have been clad in secrecy for 21 years. But H&G recently signed a contract to design and engineer an ethylene plant for the Walter Ulbricht Works in Leuna, East Germany, then negotiated a reciprocal deal: the engineering firm will assist East Germans in buying Western know-how in exchange for rights to "all the main chemical processes" of East Germany.

All told, H&G has obtained access to "some 60 processes." Included: acetylene-based chemicals, acrylonitrile, vinyl compounds, chlorine, emulsion resins, synthetic fibers, caprolactam and acrylics.

•

Columbium development will receive at least a temporary setback as a result of cancellation of programs to develop a nuclear-powered aircraft (*See also Washington Newsletter, p. 27*). Pratt & Whitney's Canel (Connecticut Aircraft Nuclear Engine Laboratory) project probably took 70% or more of the 200,000 lbs. of columbium produced last year (mostly by Wah Chang). This demand was expected to taper off this year, presumably as work on a prototype neared completion. But the cutoff was not expected to be so abrupt. Its importance to chemical process companies: it was providing a volume market, which was permitting the industry to gain experience in large-scale production and consequent cost reductions.

•

Mass production of sea-water conversion plants by Fairbanks, Morse is on the way. The firm is now tooling up for production of its Beloit, Wis., plant, expects to start line production this year. Working with the Israeli government on the vacuum freezing process developed by Israel's Alexander Zarchin, the firm is convinced that the method is the most economical one yet developed for getting fresh water from the sea.

A plant to produce approximately 250,000 gal./day of fresh water is being installed in Elath, Israel's only gateway to the Red Sea. It's due for completion this year, is scheduled to be operating in '62. Meanwhile, both the Israelis and the U.S. company are continuing research aimed at dropping costs, and are pooling results. The mass production units will be designed to permit on-site modifications of any improvements that are developed.

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A gaseous envelope for underwater missiles may double the missile's speed. Experiments carried out by Convair Division of General Dynamics indicate that a vapor layer surrounding an underwater vehicle can effect a 95% reduction in the friction drag of water—under optimum conditions. The gas is generated either by heating the vehicle (thereby

causing a steam barrier) or by building in a material that, on contact with sea water, reacts to form vapor and heat. For instance, a superheated graphite body has 95% less drag than a cold one. Convair envisions the concept as being valuable in a device such as the Polaris. It would permit the missile to get to the surface faster and, more important, would allow it to become airborne without dragging a considerable quantity of water along with it. It could also find application in torpedoes. No work has been done on submarines, but conceivably it could be extended to them.

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What may be a giant step in biochemistry has been taken at the Oak Ridge National Laboratory. G. David Novelli described to a joint Congressional committee on atomic energy how radioactivity has been put to work to synthesize proteins. By providing a means to observe the genetic process in a test tube, the work could have far-reaching effects. It could, for instance, permit the testing of a number of genetic theories and aid in finding out such information as how heredity is passed on.

•

New insight into Olin's route to synthetic glycerin may be in an Australian patent application (62,961/60). It describes conditions and separation steps for a process in which allyl alcohol is hypochlorinated and the product hydrolyzed (in the presence of soda ash) into aqueous glycerin.

•

An instrument for remote measurement of the level of radioactive liquids is now under development by General Electric at its Hanford, Wash., works. A prototype has been built and has operated well under conditions simulating those of an actual waste tank. An accurate inventory of the radioactive material is essential to prevent sludge formation and give warning of leaks. The problem is that the combination of heat, corrosive chemicals and radiation, rules out use of nearly all conventional liquid measuring devices.

At the present time a metal tape is lowered into the tank and, on contact, completes an electrical circuit and permits the level to be read. The new approach is to employ an electrode sheathed in quartz. The electrode sends high-frequency radio currents into the waste and the level is determined by the amount of current that is absorbed.

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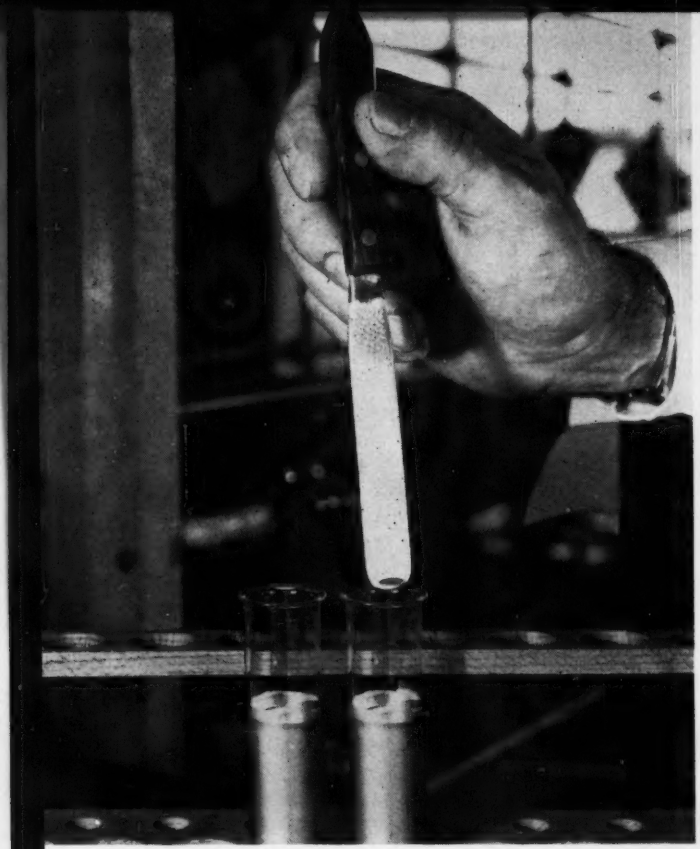
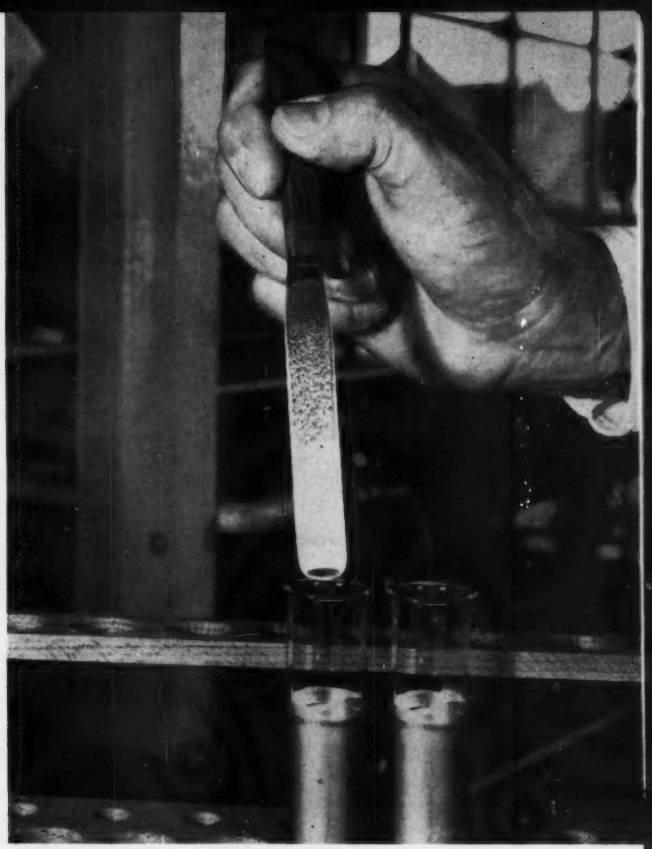
Research expenditures as a function of the gross national product have fallen under the scrutiny of the National Science Foundation in its latest survey. It found: amounts spent for research and development in '59 ($12.4 billion) came to 2.6% of the GNP; this percentage has been relatively constant over the past few years; expenditures for basic research account for only 0.2% of the GNP in recent years. The study also indicates that R&D expenditures represent approximately one-tenth of total national investment, but are relatively independent of capital expenditures for plant and equipment. While industrial organizations cut back capital expenditures from $37 billion in '57 to $30.5 billion in '58, research outlays stayed fairly constant.



NEVILLE COUMARONE-INDENE RESIN was mixed with aluminum pigment and petroleum spirits in this test. The picture was taken exactly three minutes after the spatula was removed from the test tube. Leafing has risen to 78% of the immersed surface.



COMPETITIVE RESIN used in this otherwise identical test formula was a well-known hydrocarbon petroleum type. Test procedure was exactly the same, and after three minutes complete leafing had occurred on only 46% of the area of immersion.

Try this aluminum pigment leafing test pitting Neville C-I® Resin against others

To arrive at the evidence shown above, our technicians followed test procedures as outlined under ASTM 480-59T for the leafing properties of aluminum pigments, except that we used two resins while retaining the same pigment. We believe the leafing advantage gained through the use of Neville Coumarone-Indene Resin is completely self-evident in the left-hand picture.

But there are several other benefits to be enjoyed through the use of Neville C-I Resin beyond superior initial leafing. Leaf retention is also excellent, as is resistance to water, acid and alkali. Coatings dry quickly and are durable, flexible and uniform. Use the coupon below to write for Neville's new aluminum paint bulletin.

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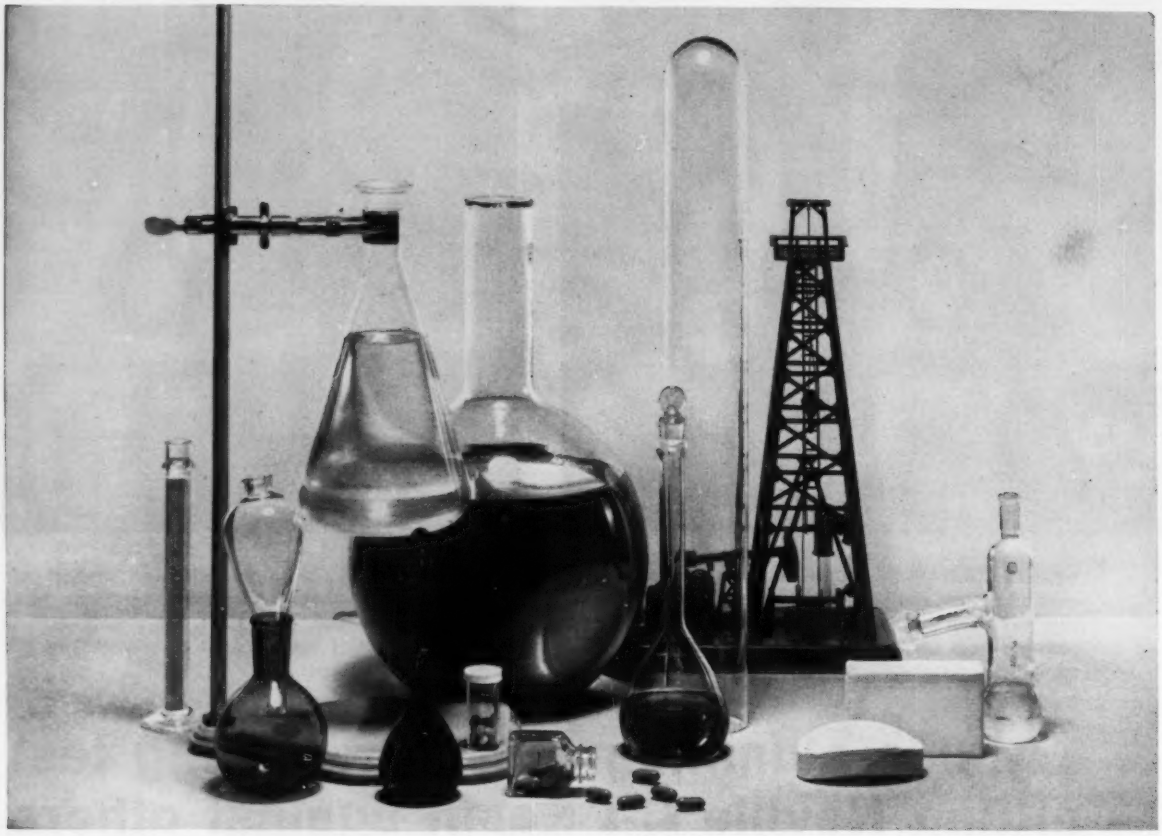

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Small grocery store dispenses bulk detergent by the scoopful. Method brought product into range of low-income families, spurred sales.

Old and New Build a Boom in Mexico

Mexico's growing demand for new consumer products is catapulting the making and merchandising of chemical specialties into one of the fastest-expanding segments of Mexican industry. The market for home laundry products alone has grown substantially the last 10 years, to approximately 100 million lbs./year. Mexico has proved to be a lucrative market for U.S. as well as native concerns—and both find that the key to success is the adaptation of selling techniques to local requirements.

Mexico has much to recommend it as a growing market for U.S.-developed specialties—although in general they must be made locally to be very profitable. The country's population is now 35 million, and is climbing at one of the highest rates in the world, 3.2%/year. With roughly one-seventh of Latin America's total population, Mexico accounts for about one-fifth of the area's purchasing power. Per-capita income is now only $350, but 10 years ago it was only $160. And value of the country's gross national product, about $11.2 billion this year, is advancing about 6%/year.

A big reason behind the growth of the specialties market is Mexico's rapid stride toward urbanization. It now has 20 cities of 100,000 or more population; they hold more than 25% of the total population. Mexico City, 5 million people, is one of the 10 largest cities in the world and also one of the most cosmopolitan and sophisticated. Areas in northwest Mexico, such as Monterrey, are accustomed to the English language and to U.S. consumer goods. But much of the Southern portion of the country is still rural.

Supermarkets, selling conventionally packaged brandname products, are battlegrounds for sales war between U.S. and Mexican soapers.

Along with the growth of U.S. brands—they are top-sellers in many categories—has come growth of U.S. advertising techniques—in most cases modified for the local market. The two most significant media are radio and motion picture theaters (the high

Bustling modern Mexico City reflects the country's rising standard of living.

illiteracy rate cuts down effectiveness of newspaper and magazine advertising). Almost everybody has a radio and can go to the movies, where ads are interspersed between feature films. Hair sprays, cosmetics and insecticides are heavily advertised in this way.

Television is moving up fast. Mexico's 400,000 TV sets are said to have an estimated 2 million audience. In economically poorer areas, TV owners often let their neighbors watch (charging them for the privilege), which expands the audience.

After World War II the entry of big U.S. stores — e.g., Woolworth, Sears, Walgreen—helped boost modern merchandising. (For instance, Sears, Roebuck de Mexico, S.A., in Mexico since '47, introduced display advertising and open pricing of merchandising. For its employees—100% natives—it offered training programs and fringe benefits such as its profit-sharing retirement plan. About 97% of Sears' products are now manufactured locally and the company buys from more than 3,000 Mexican suppliers.)

Instalment buying is another recent concept that has put many lower-income families into a buying position.

Selling by the Barrel: A striking example of adapting to local customs is the detergents field, which has mushroomed into a multimillion-dollar native business during the preceding decade. Competition is keen, with the U.S. soap giants, Procter & Gamble and Colgate-Palmolive, leading the race. P&G markets Star, Tide and Ace and is also having success with a Mexican offspring, Rapido. Colgate (probably the country's top soaper) sells a locally made Fab.

A Mexican soaper, La Corona, has come up swiftly and now is in a position to challenge the two U.S. leaders. La Corona pulled a major coup on its big competitors in marketing psychology. Reasoning that only the middle and upper classes could afford an advertised brandname product (although promotion had built up a strong desire for detergents among lower-income consumers), La Corona began selling powdered detergents in bulk, omitting the brandname. Retail stores, buying it in barrels or cardboard cartons, could sell it by the scoopful, and wrap it in newspapers. This lowered the price to half that of other detergents and La Corona's sales shot up.

Soon the U.S. companies were forced into bulk sales. A Colgate official claims that Mexico is the only place where bulk detergents are sold but adds that Colgate now may introduce bulk marketing in other semi-developed areas—e.g., Asia and Africa.

La Corona, run by Esteban and Antonio Gonzalez, recently put a new detergent plant onstream and equals P&G in Mexican production capacity. Five more Mexican companies are building detergent plants, prompted by the switch to detergents from laundry soap.

U.S. soaper Purex (South Gate, Calif.) has moved into northwest Mexico; it bought an old Mexican firm in Hermosillo, Sonora. Although it has topped other national brands in that area, Purex products are not yet nationally big in Mexico.

To provide detergent raw materials Monsanto and Hooker have both put up tripolyphosphate plants in Mexico. At first, overproduction was the problem, but briskly swelling demand may soon force the two producers to expand. Mexico's detergent makers can get 95% of their raw materials locally, a fairly unusual situation in a newly industrialized nation. The country offers tripolyphosphate, olein, alkane and sodium sulfate.

Despite the favorable raw-materials picture for detergents it's more than likely that any future U.S. interest in the Mexican market will be channeled toward finished products. There's less possibility that household specialties businesses will be nationalized; there is a very real threat that products dependent on petrochemical raw materials (e.g., detergents) may be.

Aerosols Wanted: At the opposite end of the marketing spectrum from bulk selling is Mexico's growing interest in aerosol packaging.

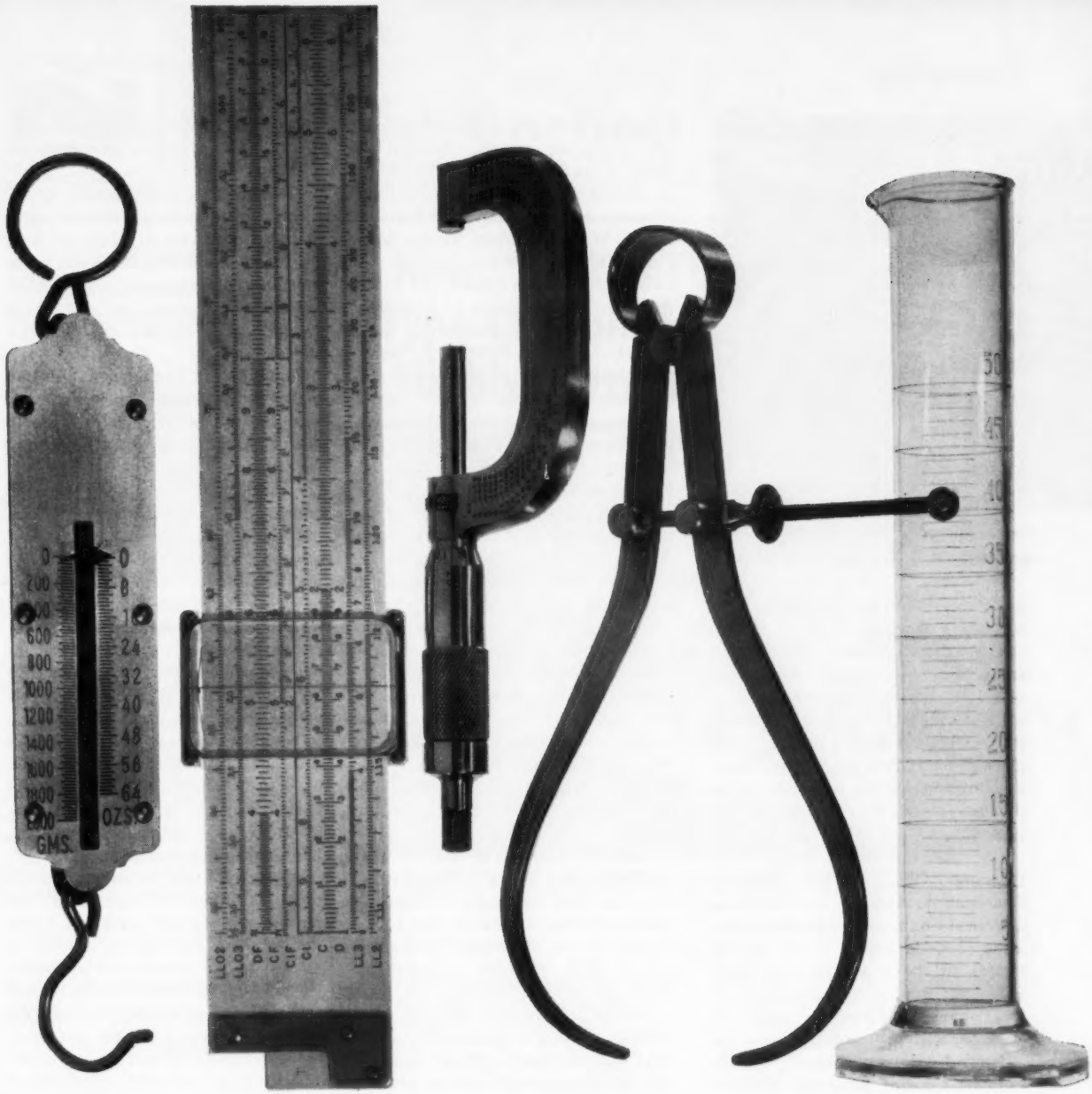
The first aerosol product to achieve popularity in Mexico was Revlon hair spray five years ago. Since then, hair sprays, as in the U.S., have remained the top-seller in aerosols. Other big-selling sprays are insecticides, room deodorants and colognes, in that order.

The country's pioneer aerosol filler is an American, Virgil Hiermeier, who went to Mexico six years ago, found that aerosols were either nonexistent or expensive as a result of import tax. He started a pilot plant and got into production in '55.

Last year Hiermeier's company, Virmex-Envases Aerosol, custom packaged some 2.2 million units for 35 clients, and output is expected to move up 25% in '61. Although several other fillers (also marketers) have now entered the field, Virmex is by far the biggest—it reportedly has 85% of the market. It is strictly a contract packager, does no marketing.

Two U.S. propellant companies are racing to get the first Mexican fluorocarbon plants into operation. Du Pont will have a 25% interest in Halocarburos, S.A., a new company formed by Industrias Quimicas de Mexico, S.A., to produce Freons. The plant, expected to be onstream by mid-'61, will have a capacity of 3 million lbs./year. General Chemical (Allied Chemical) is part owner of Quimobasicos, S.A., a new firm formed by Grupo Quimico de Monterrey to manufacture Genetron propellants.

Other components and ingredients for aerosols are already being made in Mexico. Valves are manufactured locally by a licensee of Aerosol Research Co. and containers by a Mexican licensee of Continental Can Co. Plastic bottles are due next. Anhydrous alcohol was imported until the Mexican government recently levied



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Latest U.S.-made products crowd shelves —and price haggling is a thing of past.

an import tax. Virmex has plans, however, to produce the material locally.

U.S. Brand Conscious: In other areas of the specialties market U.S. brands dominate. The top-selling insecticides are S. C. Johnson's Raid and Boyle-Midway's Black Flag line. In the consumer wax field Johnson has manufactured in Mexico under the name of Ceras Johnson de Mexico, S.A., since '54.

On the insecticide supply end, Diamond Alkali, through Diamond Chemical de Mexico, and Montrose Chemical Co., through Montrose Mexicana (both in Mexico City), are big factors in the production of DDT. Diamond went into production of DDT in '55; Montrose brought its larger operation onstream in late '58.

Sherwin-Williams, Devoe and Du Pont have highly successful Mexican paint operations. Du Pont has completed a $5-million titanium dioxide plant to supply the local paint industry. On this operation Du Pont was the ice-breaker for a Mexican government policy of requiring foreign companies to permit 51% Mexican interest in these ventures in which the foreign country might overshadow that of local producers. Du Pont affiliated with Bancos de Comercio to comply.

A recent entry into the Mexican paint market is Glidden, which late in '60 acquired General Paint Co. de Mexico (Mexico City), then a wholly owned subsidiary of General Pacific Corp. Glidden will push its consumer and industrial lines through this new affiliate.

U.S. brands also lead the toiletry and cosmetics market. Johnson & Johnson has for many years been manufacturing its baby products, surgical dressings and some ethicals in Mexico. Others: Warner-Lambert, Revlon, Max Factor, Elizabeth Arden, Mennen.

Sales of pharmaceuticals and other drugstore items continue to grow. The Sidney Ross Co., a subsidiary of Sterling Drug, has 80-85% of the analgesic market, with its Mejoral. Since the start of World War II, when supplies of German-made Bayer aspirin were cut off, the company's advertising has so thoroughly educated the Mexicans that Mejoral is now practically generic for analgesic.

Among other U.S. companies active in the drug field in Mexico are Smith Kline & French, Lederle, Merck Sharp & Dohme, and Squibb. Also vying for part of Mexico's drug sales are a number of Italian, German and Japanese companies.

Sidney Ross's Sonrisal also has a big portion of the antacid market. Suppliers of antacids are setting up local citric acid plants: Miles Laboratories has a plant under construction in Cuernavaca, and others are following.

Adhesives Expand: By summer The Borden Co. and British Industrial Plastics, Ltd., will jointly be turning out amino molding compounds. The cooperative venture, Materiales Moldeables S.A. de D.V., will have an initial capacity of 1,000 tons/year.

Borden has two other Mexican subsidiaries making formaldehyde, urea-formaldehyde resins, phenol and resorcinol thermosetting resins, protein and dextrine adhesives and polyvinyl acetate.

Also in the adhesives field is National Starch, which recently changed the name of its Mexican operation (polyvinyl acetate polymers, copolymers and adhesives) to National Starch & Chemicals de Mexico (Mexico City). Minnesota Mining, which formed a Mexican subsidiary in '51, now makes adhesives, cellulose tapes and some industrial and electrical tapes in its Mexico City plant.

High-Protein Tortilla? General Mills, through its Mexican subsidiary Protea, S.A., has introduced a food additive, which will reportedly give Mexicans a high-protein addition to their diets. Protecal is now made from soybean oil, but the company is experimenting in the use of chick peas, a product that is abundant in Mexico.

General Mills is now selling its additive to institutions, government agencies and producers of packaged food products. In a few weeks it will begin marketing directly to the public. Most important envisioned use will be as an additive in tortillas, the country's staple food.

Look Before Leaping: A specialty maker or marketer interested in getting into the Mexican market should keep these points in mind before entering into a venture: (1) He will be competing not only against Mexican companies, which may have substantial tax advantages, but also against some strong European companies; (2) the Mexican government, highly paternalistic, may tell him what prices he can charge, determine the quality of the goods he is to sell, as well as tell him when to start to produce; (3) although he may have low labor costs at the production level, he will have to pay relatively high wages for skilled help; (4) extended credit will often have to be offered; (5) the Mexican businessman he will deal with will, in most cases, be a well-educated, hard-bargaining person.

Also not to be discounted are reports that business corruption and payoffs are standard practice, which the Mexican government chooses to ignore. A U.S. supplier of petroleum waxes, for example, claims it was squeezed out of the Mexican market last year because it refused payoffs to the government oil monopoly, Pemex. The company says that complaints to the Mexican president, Adolfo Lopez Mateos, were useless and that newspaper "exposes" of Pemex have also not succeeded in changing the situation.

Outlook: U.S. specialties producers look forward to continued growing demand for their wares. Population estimates for '70 are placed at over 43 million. Also during the next 10 years, a big part of the population will be young people just setting up housekeeping and starting families (over 51% of Mexico's population are now under 20 years of age).

This factor, coupled with rising per-capita income and consumption, would seem to assure handsome profits for chemical specialties operations in Mexico.

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C. E. HULSWITT
Design Engineer

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Mr. Hulswitt was graduated from Purdue University with a B.S. degree in Chemical Engineering.

New Catalog Section Describes "Karbate" Counterflow Block Heat Exchanger

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Information on this new, advanced-design, corrosion-resistant unit includes operating features, specification data on single and multi-pass models, construction and dimensional data, fluid flow patterns, pressure drop characteristics, and mounting methods. The catalog is fully illustrated with photographs, diagrams, and graphs.

Utilizing center blocks of impervious graphite, "Karbate" heat exchangers Type CFB provide the most versatile and dependable method of processing corrosive materials.

Write today for your copy of this timely, comprehensive publication. Ask for **Catalog Section S-6813.**

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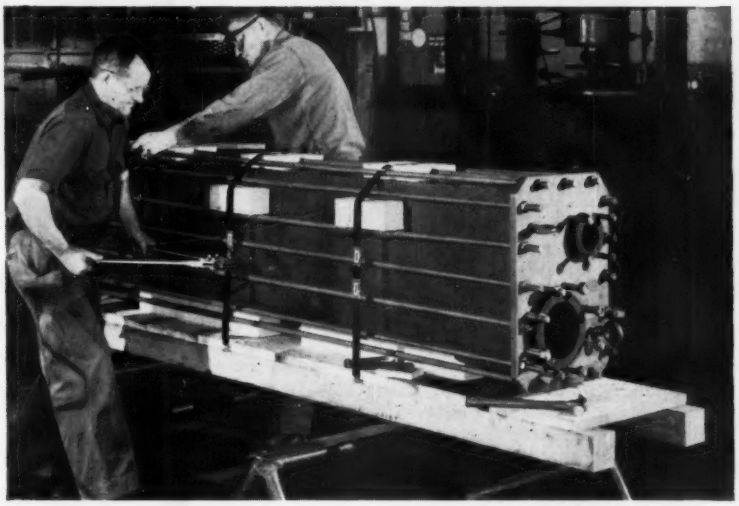

This new single-pass, three-pass unit is being prepared for shipment to a Midwestern chemical company for condensing an organic from an acid steam distillation operation. Fluids on both sides of 90 square feet of heat transfer surface contact "Karbate" impervious graphite only.

"Karbate" impervious graphite Type CFB is the newest cost-saving advancement in heat exchangers.

Measuring only 13 inches x 21 inches in cross-section, Type CFB (when mounted vertically) provides more heat transfer area per square foot of floor space than any other block type exchanger.

In addition to the unsurpassed corrosion resistance of "Karbate" impervious graphite and the high thermal efficiency of true counterflow design, Type CFB permits maximum flexibility in change of heat transfer area. Center blocks, each 23 inches long, can be varied from 1 to 6 to provide a range of areas (for 3-pass unit) from 37.3 to 172.8 square feet. Single or multi-pass units give dependable operation at pressures up to 100 psi.

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For incorporation in systems for the external heating or cooling of corrosive solutions used in plating, pickling, anodizing, and cleaning, "Karbate" impervious graphite is available in products and equipment such as: Pipe, fittings, and valves . . . for long life, easy installation, minimum maintenance.

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Other major items of "Karbate" impervious graphite include: Shell and tube heat exchangers, HCl systems, absorbers, combustion chambers, entrainment separators, and cascade coolers.

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1 BATH IMPROVES SYNTHETIC FABRICS 2 WAYS

A single soaking now makes man-made-fiber fabrics both static-free and water repellent. New bath formulation, developed in Czechoslovakia, calls for combining either Stearic or Oleic Acid and chromic chloride. Reportedly, the Oleic Acid gives a softer effect on knit goods.

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Titre	58° – 60°C.	2° – 5°C.
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Color 5¼" Lovibond Red	1.0 max.	1 max.
Color 5¼" Lovibond Yellow	5 max.	8 max.
Color Gardner 1933		2 max.
Unsaponifiable	0.75% max.	1.0% max.
Saponification Value	204 – 207	201 – 206
Acid Value	203 – 206	200 – 205
% F.F.A. as Oleic Acid		99.5 min.
Iodine Value (WIJS)	2.0 max.	90 max.
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Market Newsletter

CHEMICAL WEEK
April 8, 1961

Dwindling demand for foam rubber and rougher competition for flexible urethane markets is bringing on some belt-tightening on the West Coast. Although major producers of urethanes on the Coast could easily meet all demands, shipments of the material from other areas into southern California are continuing, aggravating the current regional oversupply situation.

One result: bulk price of flexible foam is down to 10½-11¢/lb. —from 13-14¢/lb. a few months ago. Demand for rigid urethanes, however, is reportedly still strong; one firm—American Latex Products (Hawthorne, Calif.)—says its sales of rigid foams have increased 50% in the past six months.

The softening foam market has brought about a "temporary" cutback in sales and production forces at American Latex. Unofficial estimates put trimming of sales forces in southern California, San Francisco, Seattle and Dallas at about 60%; production has been reduced to a five-day week, six-hour/day basis.

The current market slump only partly explains the readjustments at American Latex. The firm's president, C. M. Christie, says the company is in a transitional phase of de-emphasizing foam rubber output while seeking to step up activities in rigid urethanes, adhesive sealants and coatings.

American Latex has also cancelled a number of flexible urethane contracts with Eastern mattress and furniture cushion makers, and is confining sales to 11 Western states. Need for this move is attributed to extremely competitive conditions and high freight rates. Further abandonment of marginal urethane markets is anticipated.

The retrenchment moves by American Latex help scotch persistent reports that its parent, Dayco Corp., seeks to sell the American Latex property. ALP President Christie admits that several firms made overtures, but "none within the past four or five months." At the same time, Christie denied that Dayco is interested in selling ALP.

•

"Surprised and puzzled" phenol producers last week lost no time matching Dow Chemical's across-the-board ½¢/lb. phenol price cut that brought tank-car tabs down to 17¢/lb. (freight allowed).

Despite industry's general readiness to meet the competition, there was considerable off-hand debate about reasons behind Dow's "unexpected" move. Dow's reference to "weakness in the phenol price," suggested some observers, pointed to substantial under-list selling in the industry—but there were no direct admissions of such tactics.

Others saw, in Dow's move, a hint that benzene supplies may

soon be more plentiful—but there also was no unanimous opinion on this. None, however, took issue with Dow's reference to "inability of many phenol users to fully absorb increased costs"—which apparently means that most phenol producers have been feeling more than a little consumer resistance to prevailing prices, following general industry price increases last fall (*CW Market Newsletters, Sept. 17 and 24, '60*).

How will the phenol price cut affect cost of resins and other phenol derivatives? Most producers are noncommittal on this.

Buyers of phenolic compounds and resins can, of course, be expected to press for lower prices on these derivatives; they point out that increased resin prices followed boosted phenol tabs last fall—and argue that reductions on phenol derivatives are now in order.

But there is another side to the picture: it can also be argued that the phenol price cut will in fact help forestall new price increases on resins, etc. Just last week, for example, American-Marietta rescinded a 1¢/lb. price hike on phenolic resins (used as plywood adhesives) slated for April 1. Reason: other producers failed to go along with the increase. But A-M's reversal was undoubtedly easier in light of the current phenol price cut.

•

A 12-million-lbs./year polypropylene plant is being started up at Torrance, Calif., by Dow Chemical. It's the first PP unit on the West Coast and is Dow's first big step into this area. Ultimately the plant will be at least double the size of the unit now going onstream.

•

Plastisol prices are cut 8¢/lb. by Metal & Thermit, effective immediately. New tabs on M&T's Unichrome Super 5300 series of spray-applied organic coating materials: 75¢/lb. in 1-gal. quantities and 59¢/lb. in 100-drum and larger lots, f.o.b. Carteret, N.J.

•

A 3½¢/lb. price increase on antimony oxide brings costs to 30¢/lb. in carload lots and 31½¢/lb. l.c.l. The boost, by National Lead, was not explained; but oxide prices generally reflect competitive situations with imported material.

•

A new, $9-million polyethylene plant has been put in operation at Trombay Island (near Bombay, India) by Union Carbide of India, Ltd. Rated capacity: 15 million lbs./year of PE resins and organic chemicals. Some $5 million worth of products will be turned out annually, using about 3 million gal./year of raw-material alcohol to be supplied by a government-owned distillery.

Initial capacity of the plant, says Carbide, will likely be "increased several times in the next few years." The Trombay plant is the second of its kind in India; another—at Ridhra, near Calcutta—is owned by Alkali and Chemical Corp. of India.

EMULSION POLYMERIZATION MADE EASIER

Be sure to call or write for complete information concerning the specific benefits you might receive from Atlantic's superior quality Ultrawets.

In emulsion polymerization processes Atlantic Ultrawets® function as the initial emulsifier and as a post stabilizer. These alkyl aryl sulfonates perform several functions. Here's how they work: ▪ By properly orienting the monomer molecules they lower the activation energy required. ▪ Atlantic Ultrawets disperse the monomers. ▪ Give largest possible surface area to monomer droplets which, in the propagation step, is conducive to a high rate of diffusion of monomer into micells. ▪ Increase rate of polymerization. ▪ After polymerization the Ultrawets help lock the latices to form a stable emulsion.

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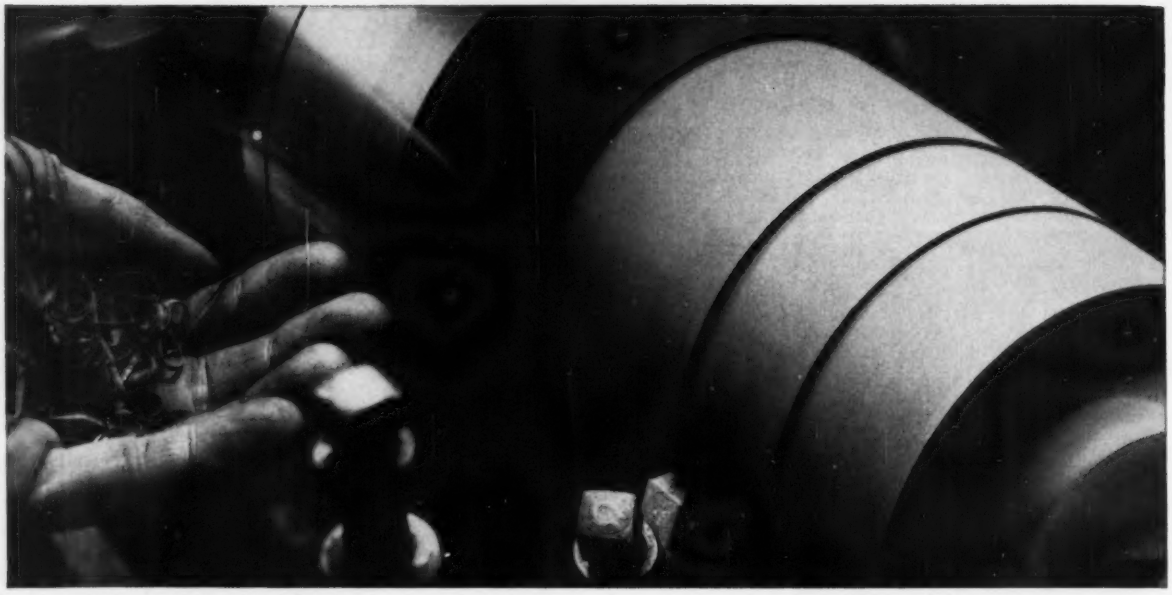
ATLANTIC PETROLEUM CHEMICALS

HOW *HERCULES* HELPS...



SOLID ENERGY FOR SPACE—Here is a cylinder of Hercules' unique, high-specific impulse propellant being machined to prepare it for physical testing. Although its advanced nitrochemistry delivers highest energy per pound of any solid fuel, it is mechanically durable, tractable, can even (with proper safety precautions) be machined. From this family of cast, composite double-base propellants comes the concentrated chemical energy that powers the second-stage A-2 Polaris motor, the third and fourth stages of the Scout, the final stage of the Minuteman, and others.

PROMOTE PROGRESS—New multicolor finishes based on Hercules® nitrocellulose are increasingly being selected by leading interior designers everywhere for a modern decorative look and long-wearing, easy-to-maintain walls. A new motion picture produced by Hercules documents the superior characteristics of this up-to-date paint and outlines its many uses. A print of the motion picture can be obtained from leading suppliers of multicolor finishes or through Hercules.

MAKE GREENS GREENER—Hercules Nitroform®, a urea-formaldehyde fertilizer compound, gives excellent initial response after application and continues to release nitrogen steadily throughout the season. This controlled feeding promotes healthier, better-looking turf, eliminates frequent "feast-and-famine" applications that formerly made turf maintenance so difficult.

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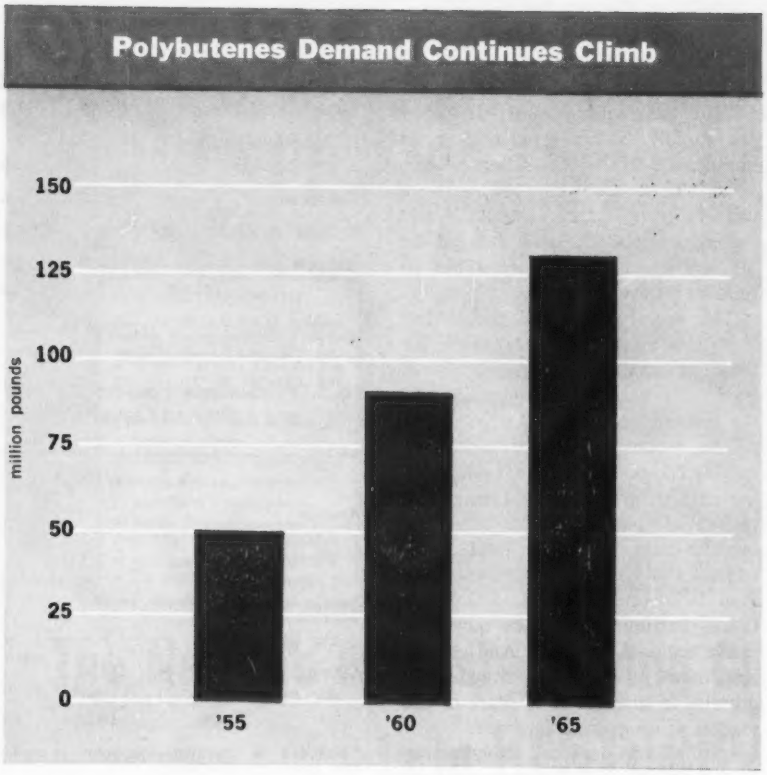
CHEMICAL MATERIALS FOR INDUSTRY

G61-4



New Uses: Polybutene Hope

Amoco Chemical Corp. (subsidiary of Standard Oil of Indiana) last month put onstream a new, 30-million-lbs./-year polybutenes plant at Wood River, Ill. And Oronite (division of California Chemical) is currently expanding polybutenes capacity at Richmond, Calif. This capacity buildup reflects the steadily growing demand for polybutenes (chart) and may be the forerunner of further expansions—if a number of potential uses now in the research stage should develop into important new markets.

Consumption of polybutenes* hit 90 million lbs. in '60, a 40-million-lbs. gain over '55's 50 million lbs. (*CW, May 28, '60, p. 70*). Capacity in '60 was about 90 million lbs./year, and a tightness of supply was felt during the year.

However, current expansions will lift polybutenes capacity† to about 145 million lbs./year. Demand should advance to at least 129 million lbs./-year by '65.

Right now, the major end-uses for polybutenes are in lubricating oils, calking compounds and sealers. These markets are expected to show moderate growth during the next five years.

But a number of new uses are currently the target of considerable research. If such uses prove out, they could significantly bolster the future of polybutenes.

One of the most promising new applications is the use of polybutenes as a lubricant in the rolling and drawing of aluminum. All of the major aluminum producers are giving this project close attention. Reason: since the polybutenes disappear from the surface of the metal, leaving no deposits or stains, degreasing and cleaning is eliminated prior to the annealing or heat-treating step. This represents a substantial cost saving to aluminum producers.

Although there's a great deal of secrecy surrounding this project in the aluminum industry, Alcoa admits that promising results have been obtained in trial runs.

Mapping the Market: As for current demand, lubricating oils are now the biggest end-use of polybutenes. In '60 this outlet took about 38 million lbs., 42% of total output in the U.S. By '65 demand is expected to reach 58 million lbs./year—an increase of 20 million lbs. over the current level.

And this growth will occur even though lubricating oil sales are expected to grow only moderately. Reason: all major lube oil manufacturers now use polybutenes as detergent dispersants in at least some of their formulations, and this usage is growing.

The polybutenes, in comparison with the competitive sulfonates have displayed outstanding performance characteristics at equivalent cost in many types of lube oil, say some of the major users.

In addition, the use-trend in the petroleum industry has been toward higher-quality oils. This means, in most cases, using more detergent. This trend is expected to continue in the short-range future. Both the U.S. government and the automotive manufacturers' requirements are influencing this move.

Currently the federal government is upping the level of its military lubricating oil specifications. Although these new specifications have not yet been issued, the consensus is that they will call for more additives—which in turn will call for additional quantities of detergent dispersants in the formulation. And there's another factor at work. The automotive manufacturers are redefining the American Petroleum Institute's M.S. specifications by establishing new and more severe engine-test procedures. The auto manufacturers may decide to analyze the quality of oil in their own laboratories, and recommend only those oils that pass the tests. This factor will work to bolster the use of polybutenes as lube oil detergent dispersants.

At the same time, of course, polybutenes will have to battle competitive

* The polybutenes discussed here are low-molecular-weight materials, ranging in molecular weight from 300 to 1,900.

† Plant capacities are approximate since output potential can be varied according to the molecular weight of the polybutenes produced.

Adhesives People

FIGHT FOAM FAST!

with SAG

SILICONE ANTIFOAMS

Adhesives producers and users alike are benefiting from the application of UNION CARBIDE's SAG Silicone Antifoams during adhesive manufacturing processes. Producers welcome the economy resulting from the elimination of time-wasting, space-eating foam. Users report that adhesives treated with SAG reduce or eliminate formation of foam in high-speed roller applications.

Two SAG Antifoams are especially adapted to fighting adhesive foaming. SAG 47 Fluid is recommended for formulations based on casein, melamine, and phenolic resins, SBR and Neoprene rubbers – while SAG 470 Emulsion is widely used for acrylic emulsions, latex, and glue processing.

Whenever liquid adhesive systems need protection from costly foaming, manufacturers report that these materials permit existing equipment to do more work, faster, while reducing downtime and improving product quality. Foam in adhesives, they point out, can well retard or render imperfect the blending of components, perhaps to the point of giving products uneven adhesive qualities.

For example, Manhattan Adhesives Corp., Brooklyn, N. Y., advises that "SAG is used to prevent foam during rapid agitation of glue – *insuring free-flowing and consistent glue processing.*"

Important plusses: Often just 50 to 100 parts of SAG per million do the job. And SAG Silicone Antifoams are non-volatile, can be used at very high temperatures, are chemically inert, and easy to apply.

Why not join the adhesives people already "fighting foam fast" – *and saving money* – with SAG. Send coupon for samples today!

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SILICONES

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My foamer is_____
Please send me appropriate SAG sample.

NAME_____ TITLE_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

polyolefins — e.g., polypropylene, which is also vying for a share of this market. Calking and sealing compounds represent another major end-use for polybutylene. In fact at one time they represented the major outlet for the material. But now they are rapidly becoming secondary in importance to the lubricating oil use.

In '60, about 38 million lbs. were used in manufacture of calking and sealing compounds, and demand by '65 is expected to grow to about 50 million lbs./year.

The construction and automotive industries are the biggest outlets for these materials. Calking compounds go into a variety of applications in the construction industry.

The expansion of the market for calking compounds has kept pace with the over-all growth of industrial and residential construction activity. During the next five years total heavy construction should increase more than 10% (current level: $22.9 million)—barring any serious downturn in the national economy. And calking compounds containing polybutenes promise to increase their share of the market at an even faster pace.

In the auto industry, polybutenes have found good acceptance in various insulating compounds such as chassis under-seal to prevent rust and corrosion of metal chassis parts; to prevent rattles and as a noise eliminator between metal-to-metal joints of body and chassis. Although compact cars might cut slightly the amount of insulating and sealing compounds needed per car, the over-all trend of polybutene-based sealants is up.

Polybutenes are also used in numerous but less important applications such as adhesives, rubber compounding, electrical oils and others. No immediate prospect of major growth is expected in any of these applications, although the adhesive field appears to be promising.

Producers' Lineup: There are now three producers of polybutenes. The largest is Amoco, which has a total, in-place capacity of about 79 million lbs./year. Amoco plants are located at Wood River, Ill. (43 million lbs./year), Yorktown, Va. (20 million lbs./year), and El Dorado, Ark. (16 million lbs./year).

Oronite, the oldest producer, manufactures polybutenes in a 25-million-lbs./year plant at Richmond, Calif. This plant is currently undergoing an expansion and will be able to produce at least 50 million lbs./year by mid-'61.

Cosden Petroleum, newest entrant in the production lineup, has a 16-million-lbs./year unit at Big Spring, Tex., and is currently considering an expansion.

In addition, both Enjay and Texaco, sizable consumers, are reportedly studying the market for these compounds and could decide to throw their hat into the ring in the near future.

In sizing up the market for polybutenes, growth is expected to be only moderate during the immediate future. But long-term prospects for burgeoning growth exist. It all depends on whether projects now in the development stage will prove out, open up big new markets. In the meantime, a balanced supply-and-demand relationship for polybutenes will exist until such potential applications turn into large commercial users.

Polybutenes Consumption by End-Use

(million pounds)

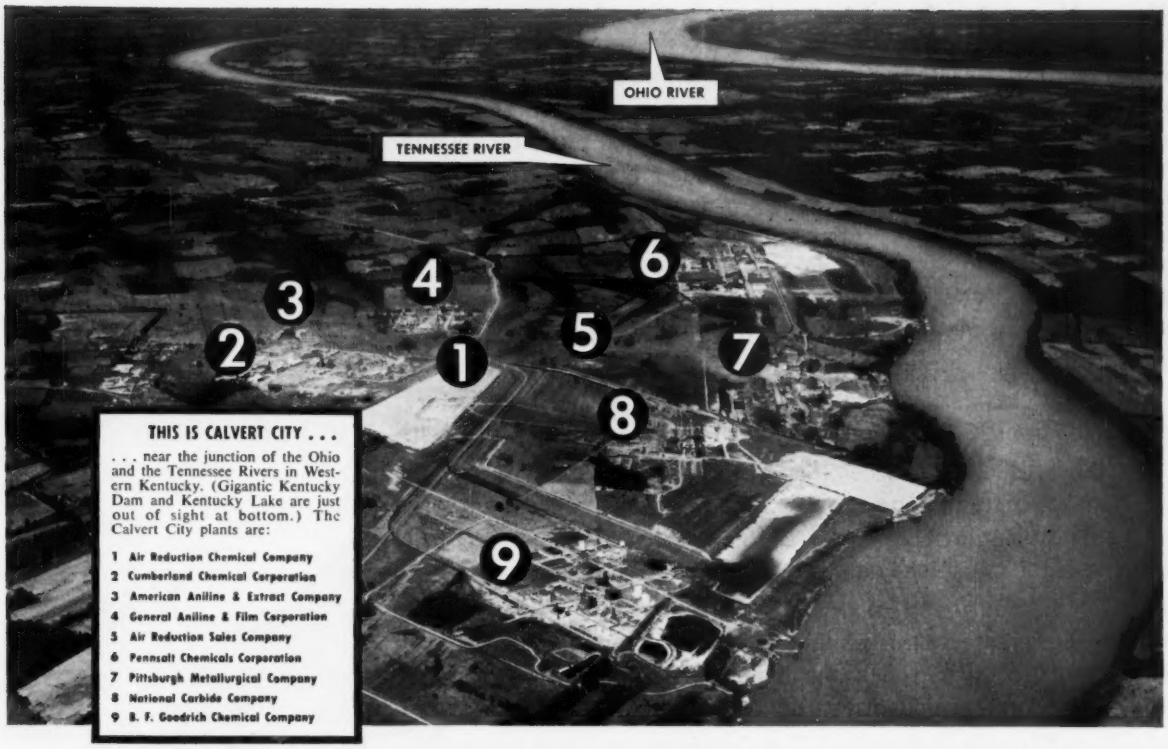
	1960	*1965*
Lube oil additives	38	58
Calking and sealing compounds	38	50
Adhesives	3	4
Rubber compounding	2	2
Exports and other	9	15
Totals	**90**	**129**

U.S. Polybutenes Producers Plants and Estimated Capacities

(million pounds)

Amoco	
Wood River, Ill.	43
Yorktown, Va.	20
El Dorado, Ark.	16
Cosden	
Big Spring, Tex.	16
Oronite	
Richmond Calif.	50*
Total	**145**

* Includes a 25-million-lbs./year expansion now under construction.


OHIO RIVER
TENNESSEE RIVER
1
2
3
4
5
6
7
8
9
THIS IS CALVERT CITY . . .
. . . near the junction of the Ohio and the Tennessee Rivers in Western Kentucky. (Gigantic Kentucky Dam and Kentucky Lake are just out of sight at bottom.) The Calvert City plants are:
1 Air Reduction Chemical Company
2 Cumberland Chemical Corporation
3 American Aniline & Extract Company
4 General Aniline & Film Corporation
5 Air Reduction Sales Company
6 Pennsalt Chemicals Corporation
7 Pittsburgh Metallurgical Company
8 National Carbide Company
9 B. F. Goodrich Chemical Company

The Nation's Fastest-growing Chemical Complex is in KENTUCKY!

This is the fastest-growing chemical complex in the nation. Looking down from the airplane, you see more than $100,000,000 in new chemical plants—which, by conservative estimates, will increase an average of $10,000,000 per year in new construction for at least 10 years.

Yet Calvert City is still only the No. 2 producer of chemicals in Kentucky. Louisville outranks it, and Ashland is not far behind. In addition, other plants are being built each year in literally dozens of other cities and towns throughout Kentucky. According to a nation-wide survey by the Manufacturing Chemists' Association, Kentucky ranks *eighth* in the nation in actual and planned expenditures for chemical facilities for the period 1959-62. Completions in 1959 totaled $20,866,000. M.C.A. says $74,250,000 will be spent for chemical construction in Kentucky in 1960-61.

What are the reasons for this explosive chemical growth? Kentucky has boundless supplies of water and other natural resources such as coal, oil, natural gas, limestone, clays, sands, fluorspar, etc. Existing electric power plants easily supply all present needs; additional plants now planned or under construction will double present production in the next few years. And transportation advantages include favorable rail rates and great barging opportunities based on the fact that Kentucky has more miles of navigable rivers than any other state. Above, you can see both the Tennessee and Ohio Rivers. And just five miles east is the mighty Cumberland River which will soon be impounded by Barkley Dam.

Last but far from least—our people, as individuals and through their local civic groups and state government, are working to improve their communities with better schools, streets, and municipal and cultural facilities. They are *eager* for the progress and opportunity inherent in industrial growth. These are not mere words—they are truths proved by the facts that Kentucky now offers more financing plans for new and expanding industries than any other state—has created the million-dollar Spindletop Research Center and Park at Lexington—has expanded the Kentucky Department of Economic Development to make it a foremost facility in its field.

We urge you to discuss your needs with this Department. You will be favorably impressed by the conservative, thorough and completely professional way in which we will try to be of help. Your inquiries will be held in strictest confidence. Address:

Lieutenant Governor Wilson W. Wyatt, or
E. B. Kennedy, *Commissioner*,
Department of Economic Development,
750 State Capitol Building, Frankfort, Kentucky

ACS CONVENTION
Division of Rubber Chemistry
LOUISVILLE, KENTUCKY
April 19, 20 & 21

COMMONWEALTH OF
KENTUCKY
WHERE BIG THINGS ARE HAPPENING

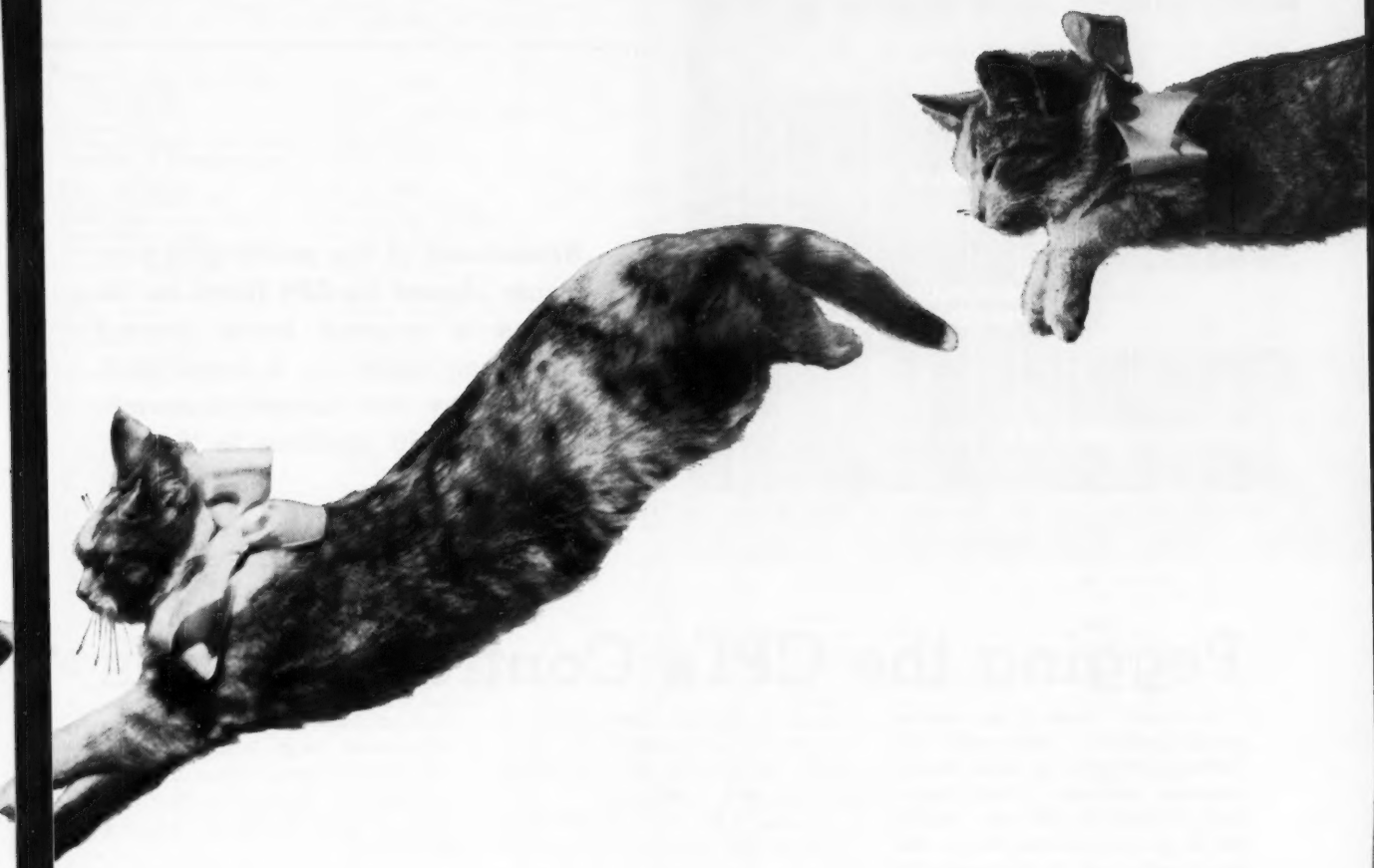
The discriminating nose— Ever since the first cat beat the first housewife to the market basket, we human beings have been curious about our sense of smell. Most recent studies explain the process this way: 1. To be smelled, a material must be volatile and continually losing molecules to the atmosphere. 2. The molecules enter the nasal passages where they are usually aided by a sniff and directed to the olfactory receptors. 3. Molecules lodge on those receptors which have suitable molecular dimensions. (Molecules of similar shape, regardless of their component atoms, frequently have a similar smell.) 4. The settling of molecules on the receptors is accompanied by an energy change, probably due to reduction of surface tension. 5. The energy change causes electric impulses to pass up the olfactory nerve to the brain. 6. Brain processes result in the sensation of smell.

This theory seems to accommodate all observed phenomena of olfaction—particularly the two chemical phenomena: Substances which are not volatile have no odor. Of the volatile substances, molecular shape of the substance determines its odor.

Pleasant aromas are an important factor in the appeal of many food products. For greatest marketability and appetite appeal, foods must be displayed in attractive packages that retain natural flavor and aroma with no effect on these qualities from the packaging material.

Marathon Division of American Can Company produces and prints millions of packages yearly for some of the nation's leading food companies. Their rotogravure printing inks must meet strict specifications for purity and lack of odor. USS nitration grade Toluene meets these requirements. Its rapid evaporation rate and low impurity content result in a minimum of residuals in the dried ink—a most important factor in protecting the full flavor of a food product.

USS nitration grade Toluene meets the highest standards of quality and is ideal for manufacture of printing inks for food packages. For assured purity, specify USS nitration grade Toluene, one of the family of chemicals produced by **United States Steel.** Chemical Sales Offices: Pittsburgh; New York; Chicago; Salt Lake City; Fairfield, Ala.



Benzene • Toluene •
Xylene • Phenol •
Cresol • Cresylic Acid •
Naphthalene • Creosote •
Pitch • Picoline • Pyridine •
Ammonium Sulfate •
Ammonium Nitrate •
Anhydrous Ammonia •
Nitric Acid

USS TRADEMARK **Chemicals**

1960 Chemical Plant Contracts
LUMP-SUM 62%
GUARANTEED MAXIMUM 10%
COST-PLUS PERCENTAGE FEE 26%
COST-PLUS FIXED FEE 2%
0 5 10 15 20 25 30 35 40 45 50 55 60 65
Per Cent

Breakdown of the nearly 200 contracts signed by CPI firms in '60 shows a marked trend toward lump-sum deals — a trend that, spurred by the current economic situation, will continue in '61.

Pegging the CPI's Contract Trends

An extensive study of the chemical process industries' 1960 engineering contracts spotlights the trend toward lump-sum contracts, a trend that is likely to continue this year. Particularly if the recession lasts longer than now expected will the lump-sum plan be favored.

The study encompassed 185 contracts (*see tables, pp. 79, 80*), totaling $1,449 million.

CW's basic contract data comes from McGraw-Hill's *Construction Daily*, augmented by information from individual inquiries to most of the contract-placing firms listed. The breakdown is shown on the bar graph above: 62% of the contracts were lump-sum; 26% were cost-plus-fixed-fee; 10% were guaranteed maximum and the last 2% were cost-plus-percentage-fee.

These four payment categories—the usual way of classifying contracts — are self-defined (*see Dimension, p. 82, for characteristics*). They fall into two distinct forms: payment in a fixed predetermined total sum—fixed-fee—or payment in proportion to the contractor's costs—cost-plus.

Chemical management, in the somewhat disappointing profit year of '60, leaned toward fixed-fee contracts. Economy was the main factor, for in a fixed-fee deal the client-company is protected. It knows before the job is under way precisely what it's getting and how much it will cost.

Because CPI management must count on this safety in fixed-fee contracts in slack times, it's likely that most firms will stay with them. However, now that there is indication that the economy is improving, other factors are beginning to play a more important role—and to complicate the contract-choosing decision.

New or Old? If a process is familiar to a contractor, the client almost invariably negotiates a fixed-fee contract, good times or bad. For example, Chemical Construction Co. (New York) builds most of its ammonia plants on a fixed-fee basis, as does Foster Wheeler (New York) when it builds urea plants.

In addition to the safety it provides, the fixed-fee arrangement is favored because for it the contractor must prepare a detailed estimate—and this is feasible only when the process is familiar.

If a cost-plus contract were chosen for a familiar process, the client would keep close watch throughout the job to keep costs down. This requires costly manpower, which means small firms are definitely inclined to pick fixed-fee deals when the process is well-known. Large firms may stick with cost-plus contracts even for standard processes, if they feel that they stand to gain by closely watching project costs.

If a process is new, the balance swings to cost-plus contracts. Reason: the detailed estimate required for a fixed-price contract is often quite costly—if feasible at all. New processes frequently require revisions throughout the engineering and design phases of work. Also, startup problems are common and certainly difficult to predict—and such contingencies must be allowed (and paid) for.

There are some exceptions to this rule about new processes — e.g., the case in which the client contracts with a company that developed a particular process—a firm such as Scientific Design (New York), which builds plants for processes it develops. Here, although the process may be new to much of industry, a detailed estimate is still practical and so is a fixed-fee contract.

The Survey: Discounting the slack business conditions as a prime factor in companies' choice of fixed-fee contracts, the high percentage of these contracts — 72% — also indicates a

Text continues on p. 82

Culling 1960 Chemical Plant Projects

Builder	Contractor	Date Let	Million $	Type of Plant	Location of Plant
Atomic Energy Commission	Jos. F. Duffy	1-13	1.68	Nuclear reactor	Lemont, Ill.
Continental Oil	Procon	1-13	1.00	Cyclohexane	Ponca City, Okla.
Spencer Chem.	Quaker Valley Construction	1-11	6.00	Polyethylene	Orange, Tex.
Camden, N.J.	Carl Widell	1-8	1.48	Water treating	Camden, N. J.
Jones & Laughlin Steel Corp.	Wilputte C. D.	1-6	9.50	Coke ovens	Pittsburgh, Pa.
Aluminum & Chemical Corp.	Kaiser Engrs.	2-24	3.00	Magnesia refractories	Midland, Mich.
U.S. Engineering	C. W. Regan	2-16	2.26	Low-temperature research lab	Hanover, N. H.
British American Oil	Poole-Pritchard Co.	2-12	12.50	Gas processing	Rombley, Alta.
North American Aviation	Wingate Construction	2-12	1-31	Thermodynamic lab	Columbus, O.
Canadian Oil Corp.	Ralph H. Parsons	2-4	3.00	Crude oil topping	Innissoil, Alta.
Southeast Power Combine	Stone & Webster	1-28	30.00	Nuclear reactor	Parr, S. C.
American Cyanamid	John McShane	1-27	4.00	Laboratories	Princeton, N. J.
Borden Chemical	United Engineers & Constructors	1-27	4.00	Vinyl polymer	Illiopolis, Ill.
Collier Corp.	Western Knapp	1-25	1.00	Uranium mill	Canon City, Colo.
Jefferson Lake Sulphur Co.	Tellepson Petro-Chem. Constr.	1-25	3.00	Asbestos	Copperopolis, Colo.
Goodrich Chemical	C. F. Braun	1-21	n.a.	Polyvinyl chloride	Watson, Colo.
The Pantasote Co.	Scientific Design	1-19	1.70	Plant expansion	Passaic, N. J.
Carolina Giant Cement Co.	MacDonald Engineering	1-19	4.00	Cement plant	Harleyville, S. C.
Food Machinery and Chemical	United Engineers & Constr.	3-23	n.a.	Pilot plant making metallurgical coke from subbituminus coal	Kemmerer, Wyo.
Pennsalt	Catalytic Construction	3-22	1.50	Alkylamines	Wyandotte, Mich.
Union Carbide	Brown & Root	3-22	2.10	Plant additions	Brownsville, Tex.
Ethyl Corp.	Catalytic Construction Corp.	3-15	6.00	Vinyl chloride monomer	Houston, Tex.
Bay Petroleum Co.	O. L. Olsen	3-15	1.15	Processing addition	Houston, Tex.
Dixon Chemical	Vulcan-Cincinnati	3-11	3.00	Hydrofluoric acid	Paulsboro, N. J.
Santa Cruz	Sharley Construction	3-7	1.50	Water treatment	Santa Cruz, Cal.
Cosden Petroleum	Badger Mfg.	2-29	2.75	Ethylbenzene and polybutene	Big Spring, Tex.
Medusa Portland Cement Co.	Nicholson Co.	2-25	2.00	Cement plant expansion	Dixon, Ill.
Warren Petroleum	Delta Engineering	4-14	2.50	Gas and sulfur plants	Jourdantown, Tex.
Continental Oil	Hudson Engineering	4-13	2.00	Natural gas	Lake Charles, La.
Sohio	Babcock & Wilcox	4-13	1.25	Boiler	Lima, O.
Big Horn Gypsum	Williams & Peterson Constr.	4-13	3.00	Gypsum board	Cody, Wyo.
Great Western Aggregates Inc.	Martin K. Elby	4-13	1.72	Aggregates	Denver, Colo.
Wichita Falls	Natkin & Co.	4-12	1.75	Water treatment	Wichita Falls, Tex.
Atomic Energy Commission	C. F. Braun	4-12	4.00	Exp. organic-cooled reactor	Idaho Falls, Ida.
Stauffer Chemical	Rothchild Raffin	4-8	1.17	Research center	Richmond, Colo.
El Paso Natural Gas	Fluor Corp.	4-7	3.00	Gas treating	El Paso, Tex.
Scott Paper	Wigton Abbott	4-6	3.00	Research center	Philadelphia, Pa.
Chicago, Ill.	Link Belt Co.	4-4	1.20	Filtration plant	Chicago
Consumers Cooperative	Procon	3-31	2.70	Platformers (2)	Regina, Sask.
P. Lorillard	H. L. Cohle	3-24	7.00	Processing plant	Danville, Va.
Copolymer Rubber & Chem. Co.	Foster Wheeler	5-6	4.45	Butadiene addition	Baton Rouge, La.
Phillips Petroleum	M. W. Kellogg	4-27	4.25	Catalytic cracker	Bartlesville, Okla.
Ideal Cement	Martin K. Elby	4-27	1.72	Cement	Denver, Colo.
Runnels Gas Products Corp.	Fluor Corp.	4-21	n.a.	Gas plant addition	Eunice, Pa.
Shulton, Inc.	Commercial & Industrial Construction	4.15	1.00	Pharmaceutical	Memphis, Tenn.
Puerto Rico and AEC	Maxon Construction	4-15	11.00	Nuclear power	San Juan, P.R.
Crown-Zellerbach Corp.	Fluor Corp.	5-16	1.50	Dimethyl sulfide, dimethyl sulfoxide	Bogalusa, La.
American Oil Co.	M. W. Kellogg	5-16	53.00	150,000-bbls. crude and 46,000 cat-cracking	Texas City, Tex.
Providence, R.I.	Sterling Engineering	5-13	1.80	Water treating	Providence, R.I.
Allied Chemical	Wigton Abbott	5-13		Laboratory addition	Plainfield, N.J.
Colorado Fuel & Iron	H. K. Ferguson	5-13	8.00	Oxygen converter for steel mill	Pueblo, Colo.
Rochester, N.Y.	Malan Construction	5-12	1.27	Sewage treating	Rochester, N.Y.
Garden State Paper Co.	Jos L. Mascovella, Inc.	5-12	2.00	Newsprint	Garfield, N.J.
Tennessee Oil Refining Co.	O. L. Olsen Co.	5-11	1.25	Natural gas processing plant	Texas
Sun Oil Co.	Foster-Wheeler Corp.	5-9	3.60	Propane deasphalting	Toledo, O.
Kaiser Gypsum	H. J. Kaiser Co.	5-9	5.00	Gypsum	Houston, Tex.
Los Angeles, Calif.	Peter Kiewit Sons	6-10	4.96	Water treating	Los Angeles, Calif.
Pittsburgh Chemical	Neighborgall Construction	6-9	2.00	Activated carbon	Catlettsburg, Ky.
Sohio & Atlas Powder	M. W. Kellogg	6-9	5.00	Ammonia	Joplin, Mo.
Atlanta, Ga.	Atlantic State Construction	6-7	4.00	Water treating	Atlanta, Ga.
Allied Chem.	Owner	6-7	5.00	Plant addition	Moundesville, W. Va.
Kordite Corp.	Owner	6-3	2.00	Laboratories	Macedon, N.Y.
Petro-Tex Chemical Corp.	Scientific Design	6-1	9.00	Maleic anhydride	Houston, Tex.
Detroit, Mich.	R. E. Dailey	5-27	1.79	Sewage disposal	Detroit, Mich.
Sinclair-Koppers	Badger Mfg.	5-27	10.00	Styrene monomer	Houston, Tex.
The Denver Post	F. J. Kirchoff Construction	5-25	1.00	Paper plant	Denver, Colo.
Great Canadian Oil Sands Ltd.	Lubecker Machinenbans Gyp., M. W. Kellogg, Hannix Co., Link Belt Co.	5-17	99.34	Plant to extract oil from sands, dehydrate, coking and desulfurizing	Athabaska, Alta.
Hercules Powder	E. C. Machin, Inc.	6-24	1.00	Cement	Stockertown, Pa.
Mineola, N.Y.	Baylor Const. Corp.	6-23	1.45	Sewage treating	Mineola, N.Y.
Milwaukee, Wis.	Siegel Construction Co.	6-22	2.22	Water purification	Milwaukee, Wis.
Atlas Cement (U.S. Steel)	McClelland Construction Corp.	6-20	8.25	Cement addition	Waco, Tex.
British Titan (Products of Canada)	Stone & Webster Co.	6-20	15.00	Titanium oxide pigments	Tracy, Que.
Los Angeles, Calif.	Peter Kiewit Sons	6-17	4.96	Water treating	Los Angeles, Calif.
Henderson, Ky.	Forcum Lannon, Inc.	6-16	1.06	Water treating	Henderson, Ky.
Bestwall Gypsum	G. K. Heebner, Inc.	6-15	2.00	Gypsum	Wilmington, Del.
Chatham Chemical Corp.	Scientific Design	6-15	7.50	Ethylene glycol	Beaumont Tex.
Southwest Forest Industries	Rust Engineering	6-14	32.00	Kraft newsprint	Snowflake, Ariz.
Ashland Oil	Badger Mfg. Co.	6-13	5.00	Hydrodealkylation	Catlettsburg, Ky.

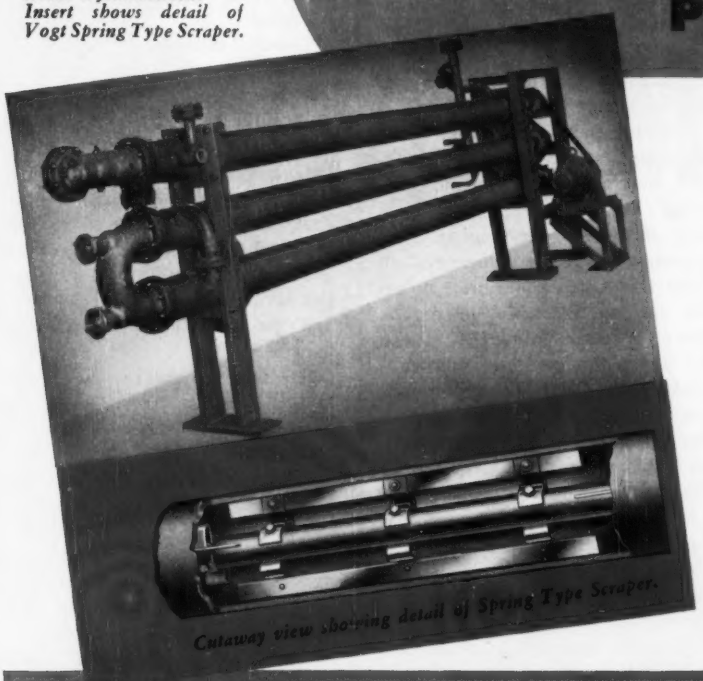
Builder	Contractor	Date Let	Million $	Type of Plant	Location of Plant
Alpha Portland Cement Co.	Nicholson Co., Inc.	7-1	2.00	Cement	Catskill, N.Y.
Food Machinery and Chemical	Fluor Corp., Singmaster & Breyer	7-5	4.00	Dimazine manufacture	San Jose, Calif.
Cleveland Cliffs Iron Co.	Arthur G. McKee	7 7	3.00	Iron pelletizing unit	Republic, Mich.
Union Carbide Corp.	Brown & Root	7-7	30.00	Polyethylene	Guayanilla, P.R.
Allied Chemical Co.	Daniel Constr. Co.	7-11	35.00	Nylon yarn	Irmo, S.C.
Firestone Tire & Rubber	Lummus Ltd.	7-12	30.00	Synthetic rubber	Uttar Pradesh, India
Rohm & Haas	Johnson & Galyon Construction	7-13	3.00	Plexiglas	Knoxville, Tenn.
American St. Gobain	Daniel Construction Co.	7-13	40.00	Glass	Kingsport, Tenn.
Dixie Land & Timber Co.	Stone & Webster	7-26	30.00	Kraft pulp mill	Phenix City, Ala.
Caltex	M. W. Kellogg	7-26	33.00	Oil refinery	Karachi, Pakistan
Kennecott Copper Co.	J. F. White Engineering Corp.	7-29	1.08	Leaching plant	Hurley, N.M.
Continental Oil Co.	Pioneer O. F. Construction Co.	8-1	1.20	Refinery pumping	Bethany, Mo.
Sun Oil Co.	M. W. Kellogg	8-3	8.00	Naphthalene	Toledo, O.
Susquehanna Western	Susquehanna Engrg. Co.	8-4	1.75	Uranium ore	Falls City, Tex.
Air Force	A. G. McKee & Co.	8-10	15.00	Missile fuel	Saltville, Va.
Linde	M-P Constr. Co.	8-10	2.00	Liquid oxygen	Neosho, Mo.
Gulf Oil Corp.	Bechtel Corp.	8-11	4.00	Lube oil plant	Port Arthur, Tex.
Amer. Synthetic Rubber	C. F. Braun	8-12	15.00	Polybutadiene and Polyisoprene	Louisville, Ky.
Ford Motor Co.	Dravo Corp.	8-12	2.00	Oxygen	Dearborn, Mich.
AEC	The Martin Co.	8-12	3.95	Pressure-water reactor	Baltimore, Md.
Ford Motor Co.	Stewart Hines Corp.	8-16	6.00	Glass plant	Niagara Falls, Ont.
Ashland Oil & Refining	Badger Mfg.	8-17	4.00	32,000-bbl. vacuum unit	Ashland, O.
El Paso Natural Gas	Fluor Corp.	8-18	4.00	Ethylene	Odessa, Tex.
El Paso Natural Gas	Fluor Corp.	8-18	3.75	Polypropylene	Odessa, Tex.
AEC	Braun & Fluor	8-19	6.00	Organic coded reactor	Arco, Ida.
Allied Chemical Corp.	Daniel Constr. Co.	8-23	3.00	Caprolactam addition	Chesterfield, Va.
Allied Chemical Corp.	Daniel Constr. Co.	8-23	3.00	Caprolactam addition	Hopewell, Va.
Republic Steel Corp.	Hawkin-Arbadel-Dixon	8-24	120.00	Taconite	Silver Bay, Minn.
Olin Mathieson	Blaw-Knox	8-31	13.00	Chlorine and caustic soda	Charleston, Tenn.
American Oil Co.	Fluor Corp.	8-29	18.00	Alkylation unit	Texas City, Tex.
Meredith & Co.	Hudson Engineering Corp.	8-30	3.95	Gas	Port Arthur, Tex.
Brockway Glass Co.	K. H. Clark Engineering	9-1	2.50	Glass	Rosemount, Minn.
El Paso Natural Gas	Fish Engineering Corp.	9-1	4.75	Olefin plant	Odessa, Tex.
Tidewater Oil Co.	Brown & Root	9-2	1.75	Gas	Palestine, Tex.
Tidewater Oil Co.	Brown & Root	9-2	2.45	Sulfur	Winnsboro, Tex.
Signal Oil & Gas Co.	Procon	9-7	2.62	Hydeal	Houston, Tex.
Signal Oil & Gas Co.	Brown & Root	9-7	1.44	Catalytic cracking	Houston, Tex.
SunOlin Chemical Co.	Lummus Co.	9-19	20.00	Ethylene-ethylene oxide	Marcus Hook, Pa.
Scott Paper Co.	United Engineers & Constructors	9-21	3.00	Paper	Chester, Pa.
Canadian Titanium Pigments Ltd.	R. E. Stewart Corp.	9-21	1.00	Titanium pigments	Varennes, Que.
Baltimore Gas & Electric	Fenix & Scissor, Inc.	9-26	1.30	Propane plant	Baltimore, Md.
Heyden Newport Chemical Corp.	Scientific Design	9-28	1.00	Maleic anhydride	Woodbridge, N. J.
Bestwall Gypsum Co.	George K. Heebner	10-3	7.50	Gypsum plant	Wilmington, Del.
Halifax Paper Co.	Rust Engrg.	10-3	1.75	Paper pulp	Roanoke Rapids, N. C.
Jones & Laughlin Steel Co.	Air Products, Inc.	10-6	10.00	Oxygen plant	Cleveland, O.
Cooperative Farm Chemicals Assn.	Chemical Construction Co.	10-7	1.00	Urea addition	Lawrence, Kan.
Monsanto Chemical	Badger Mfg. Co.	10-10	3.00	Plasticizers	Swedesboro, N. J.
Guatemalan Government	Lummus	10-11	3.50	Oil refinery	Guatemala
General Electric	Gen'l. Vacuum Corp.	10-13	1.00	Vacuum furnace	Schenectady, N. Y.
Std. Lime & Cement Co.	MacDonald Engineering	10-13	2.00	Cement	Woodville, O.
San Diego, Calif.	Westinghouse	10-20	1.61	Saline-water conversion	San Diego, Calif.
Shell Refining Co.	Bechtel International	10-20	24.00	Refinery	Batangas, Philippines
Dow Chemical	Schuman Construction Co.	10-24	4.00	Polyethylene foam	Ironton, O.
Continental Titanium	Jean Louis Steward	10-28	2.00	Titanium dioxide	Roe, St. Paul, Que.
Ideal Cement Co.	Robert E. McKee	10-30	7.00	Cement	Albuquerque, N. M.
Air Force	Kaiser Engineering	10-31	11.86	Missile plant	Brigham City, Utah
Air Force	Thiokol Chemical Corp.	10-31	16.85	Missile plant	Brigham City, Utah
Solar Nitrogen Chemicals	A. C. McKee & Co.	11-7	3.00	Urea plant	Joplin, Mo.
Sun Oil Co.	The Lummus Co.	11-10	11.00	Chemicals	Claymont, Del.
Dow Chemical	Hoffman Construction	11-10	5.00	Phenol	Kalama, Wash.
Diamond Alkali	C. F. Braun & Co.	10-14	4.50	Acetylene	Deer Park, Tex.
Pasadena Gas & Electric	Bechtel	10-14	19.00	Nuclear power	Eureka, Calif.
Northern Gas Prod. Co.	Fluor Corp.	10-15	9.00	Propane extraction	Bushton, Kan.
Archer-Daniels-Midland	Gridley Engineering Corp.	10-16	15.00	Chemicals	Peoria, Ill.
Cold Spring Chemical Corp.	Bechtel	10-23	22.00	Ammonia plant	Fort Madison, Ia.
Columbian Carbon Co.	Walter Kidde	10-23	1.75	Carbon black	Houston, Tex.
Shell Oil Co.	C. F. Braun	12-1	1.00	Petrochemicals	Martinez, Calif.
Natser Al. & Chem.	Natser Engrs.	12-2	2.00	Primary reduction	Chalmette, La.
Natser Al. & Chem.	Natser Engrs.	12-5	1.40	Aluminum fluoride	Baton Rouge, La.
Columbian Carbon Co.	Brown & Root	12-7	5.00	Carbon black	Hamilton, Ont.
Armour & Co.	M. W. Kellogg	12-12	30.00	Chemicals and fertilizer	Cherokee, Ala.
Tennessee Oil Refining	Bechtel	12-12	5.00	6,000-bbls. cat. ref.	Chalmette, La.
AEC	Nuclear Development Corp.	12-15	1.40	Fast-burst reactor	Oak Ridge, Tenn.
Union Carbide Corp.	Brown & Root	12-20	1.50	Polyethylene	Seadrift, Tex.
Chem. Div. Pittsburgh Plate Glass	Walter Kidde	12-21	2.40	Chemicals	Corpus Christi, Tex.
Texas Gulf	Stearns-Roger	12-21	22.50	Potash	Moab, Utah
El Paso Natural Gas	Owner	12-22	1.20	Gas-drying	Sanderson, Tex.

Source: Construction Daily, McGraw-Hill publication.

Vogt

SCRAPED SURFACE EXCHANGERS *Solve* those Special Heat Transfer and Crystallization Problems . . .

BELOW: *A scraped surface unit for production of Para-Xylene by fractional crystallization. Insert shows detail of Vogt Spring Type Scraper.*



Cutaway view showing detail of Spring Type Scraper.

. . . *And Here's How:*

1. Rotating scraper action continuously sweeps surfaces clean even while processing highly adhesive materials.
2. Uniform rate of heat transfer keeps crystallization under control and discharges crystals as a slurry.
3. Product is thoroughly mixed by scraper blades as it flows.
4. Closed, pressure-type system permits use of flammable, volatile and expensive solvents with complete safety and no solvent loss.
5. Units fabricated from a broad range of materials to suit process stream characteristics.

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- Clay
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- Fatty Acid Solutions
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- Paratone & Solids
- Phenolic Resins
- Polyester Liquid
- Pressed Distillate
- Reduced Petroleum
- Waxy Oil-Solvent Mix
- Soybean Oil
- Sperm Oil
- Sugar Syrup
- Sulfur-Oil Mix
- Sulphate Solution
- Tall Oil-Naphtha-Sulfuric Acid Solutions
- Tetrachloro Benzene
- Viscose
- Wax Slurry
- Para-Xylene

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high percentage of plants using familiar processes (*see charts, pp. 79-80*).

At the same time, study of the contracts shows a relationship between the size of a company and the type of contract chosen. Expectations are that smaller firms would stick to fixed-fee contracts and larger ones choose more cost-plus deals. The chart omits the contract choice in each case because of the firms' concern for secrecy. But a CHEMICAL WEEK check with the companies shows the predicted relationship to be borne out.

Timing: Besides the state of the economy (including the financial condition of individual producers and whether the process is new or standard) the third main factor in choosing contracts is timing. An operating firm that is concerned about getting a new plant onstream fast will find advantages in cost-plus contracts. Only a preliminary estimate is necessary in these, and then the contractor can swing right into the job.

In a fixed-fee case, unless the contractor has recently built a plant similar to the one it's bidding on, the detailed estimate will be long and time-consuming.

The Cost Plus: Once an operating firm has narrowed the contract possibilities down to either the fixed-price or the cost-plus type, it must get down to payment form—lump-sum or guaranteed maximum and cost-plus-percentage or fixed-fee, or variations thereof. At this point a client may begin negotiations with a contractor, work out the variation of contract that best suits the job.

In choosing a cost-plus type of contract, the survey shows, only 8% of these are cost-plus-percentage-fee; the rest are cost-plus-fixed-fee. This might well be expected, for there is a common criticism of cost-plus-percentage contracts: they give every incentive for the contractor to increase his costs rather than hold them down.

However, if the client has the manpower and experience to evaluate the contractor's expenditures this pitfall in cost-plus-percentage contracts can be eliminated. Management feels, however, that even if it has the opportunity to control the contractor's costs, the cost-plus-fixed-fee contract also permits this control and it limits the contractor's profits, cuts out an undesirable incentive.

Fixed: Which type of fixed-price contract is best? On the face of it, the contractor would prefer a lump-sum contract, since it offers him all the savings if the job costs less than the stipulated price. And the client would prefer a guaranteed maximum, since he stands to share in the potential underrun. Also it would seem that a client would be less inclined to choose a lump-sum deal because this offers more incentive for the contractor to cut costs, perhaps save money at the expense of quality.

However, digging deeper, the situation isn't this easily analyzed. Contractors may bid higher on guaranteed-maximum jobs to allow for the shared underrun. Lump-sum jobs can be bid down to a rock-bottom price; then underruns are unlikely—a contractor must work hard to avoid overrunning.

One of the big questions in these two contracts is the "contingency," an amount added in the bid price to account for unpredictable costs. The problem in determining the contingency lies in this question: Who runs the risk? That is, should the contractor or the client risk successful completion of the job under the guaranteed-maximum or lump-sum figure?

The risk is shared, of course. But the higher the contingency, the less risk the contractor carries. The lower the contingency, the more risk on the part of the contractor.

Final Decision: When it comes down to getting the lawyers together and writing out the contract, the four main categories of arrangements become blurred. Every job is different. Every contract is different. Many overlap categories—fixed-fee for one portion of the job, cost-plus for another. Or contractors may offer so-called "evergreen" deals—when the client chooses the final type of contract after the job is under way.

But the survey shows the over-all, national picture. And although some firms did not want their contract choice specifically identified, enough information was made available to CHEMICAL WEEK to allow compilation of percentages. Lump-sum contracts are way out in front and likely to stay there.

Fluctuations in the national economy and in marketing strategy—emphasis on new products or expansion of well-accepted ones—are the keys to this trend.

DIMENSION

Here are definitions and characteristics of four basic types of engineering contracts:

Lump-sum: The contractor agrees to a single predetermined payment. If the job costs less than the agreed price, he pockets the difference as additional profit. If his costs run over, he loses. Terms are usually arranged to handle the possibility of changes in the client's plans after the contract is signed.

Detailed estimation is required. The client must state precise needs, and the contractor must determine the nuts-and-bolts of the job to arrive at a lump-sum bid.

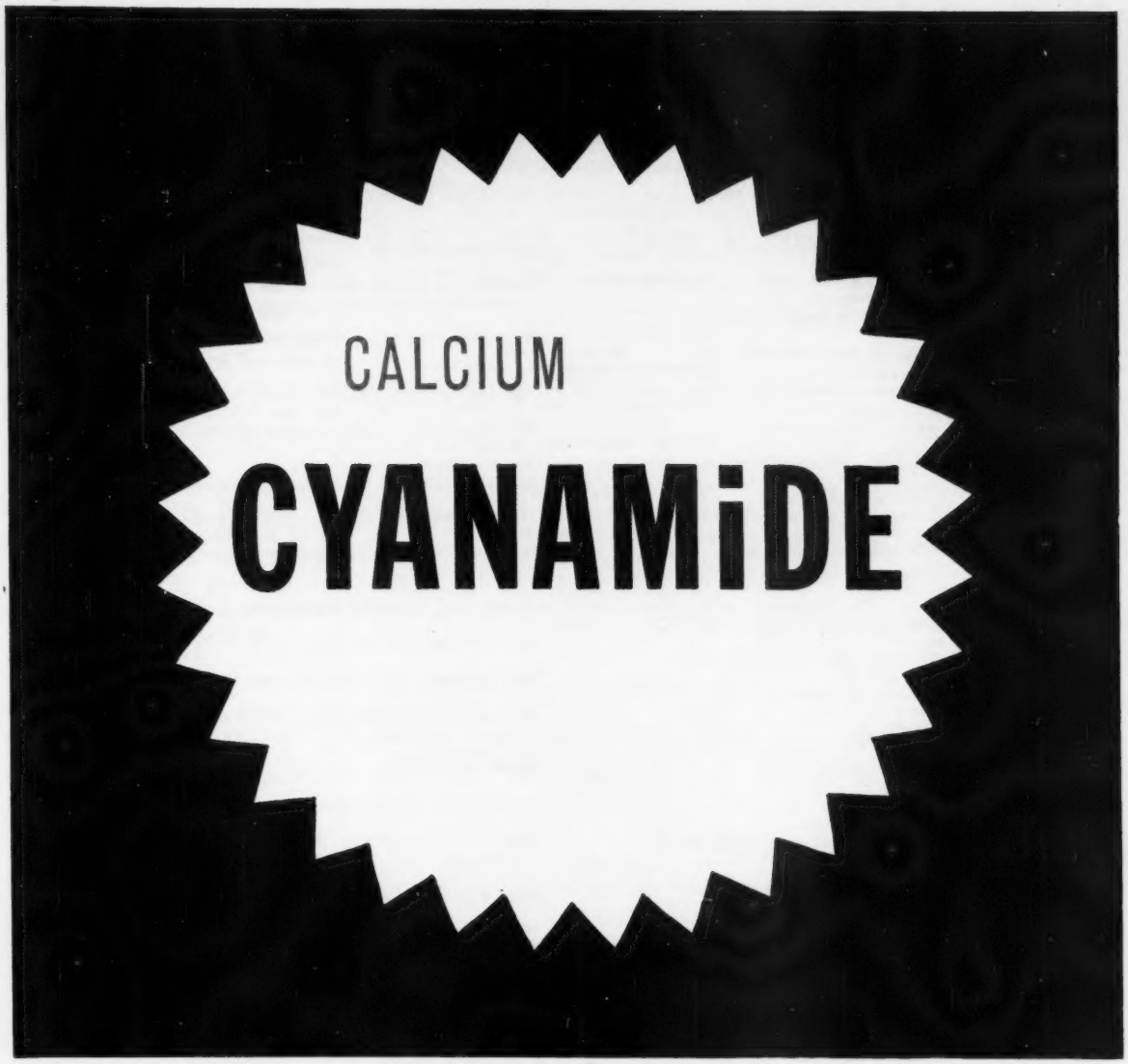
Guaranteed maximum: The payment here is the same as a lump-sum deal, with one difference: if the job cost including profit and overhead is less than the maximum agreed to, this saving is shared by the contractor and the client. The underrun split may be 50-50, although the client is more likely to get the larger share, say 70-30. This division is negotiated as are other details of any commercial contract.

Cost-plus-percentage-fee: This term, which is almost always shortened to simply "cost plus," means that the contractor receives payment for all costs, plus a percentage for overhead and profit. This percentage varies widely, depending how big the job is and whether the contractor is doing construction or both engineering and construction.

Detailed estimation is not required here, as it is in the fixed-price cases. Only a preliminary cost-and-design prediction is done. However, throughout the job, the contractor must keep a detailed, up-to-date accounting record. Reason: the client is paying the contractor's costs, so he's certainly going to keep up with them.

Cost-plus-fixed-fee: This plan is similar to cost-plus-percentage-fee, but the client pays overhead and profit in a predetermined fee—plus all direct costs incurred.

Full accounting records are open to the client here, as in the cost-plus-percentage-fee contract. However, the paperwork before a negotiation is completed is less than in a cost-plus-percentage deal.



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ALLIED CHEMICAL CORP., NITROGEN DIV. Agency—G. M. Basford Co. 65

AMERICAN CYANAMID CO. Agency—Erwin Wasey, Ruthruaff & Ryan, Inc. 83

ARAPAHOE CHEMICALS, INC. Agency—The Schuyler Hopper Co. 54

ARMOUR INDUSTRIAL CHEMICAL CO. Agency—The Buchen Co. 38-39

ATLANTIC REFINING CO. Agency—N. W. Ayer & Son, Inc. 71

BLOCKSON CHEMICAL CO. Agency—Wm. Balsam Adv. 30

BUTLER MANUFACTURING CO. Agency—Aubrey, Finlay, Marley & Hodgson, Inc. 20

BZURA CHEMICAL CO., INC. Agency—Ray Ellis Advertising, Inc. 26

CELANESE CORP. OF AMERICA Agency—Ellington & Co., Inc. 13

CHEMICAL WEEK 10

COOPER-BESSEMER CORP., THE Agency—The Griswold-Eshleman Co. .. 19

DIAMOND CRYSTAL SALT CO. Agency—Duffy, McClure & Wilder, Inc. .. 62

DOW CORNING CORP. Agency—Church & Guisewite Adv., Inc. 44

DURIRON CO., THE Agency—Odiorne Industrial Adv., Inc. ..... 4th cover

EASTERN INDUSTRIES, INC. Agency—Remsen Advertising, Inc. 54

EASTMAN CHEMICAL PRODUCTS, INC. Agency—Fred Wittner Co. 4

ENJAY CHEMICAL CO. A DIV. OF HUMBLE OIL & REFINING CO. Agency—McCann-Erickson, Inc. 43

ETHYL CORP. Agency—Reach, McClinton & Co. 2

GENERAL AMERICAN TRANSPORTATION CORP. Agency—Edward H. Weiss & Co. 12

GROSS & CO., INC., A Agency—G. M. Basford Co. 68

HARCHEM DIV., WALLACE & TIERNAN, INC. Agency—Barber & Drullard, Inc. 37

HERCULES POWDER CO. Agency—Fuller & Smith & Ross, Inc. 72

HOOKER CHEMICAL CORP. Agency—The Rumrill Co., Inc. 53

INTERNATIONAL FLAVORS & FRAGRANCES, INC. Agency—Oliver Beckman, Inc. 29

JEFFERSON CHEMICAL CO. Agency—Robinson, Gerard, McGary, Inc. 16

KENTUCKY DEPT. OF ECONOMIC DEVELOPMENT Agency—Doe Anderson Advertising Agency 75

LUCIDOL DIV., WALLACE & TIERNAN, INC. Agency—Barber & Drullard, Inc. 36

McGRAW-HILL BOOK CO. 46

MARATHON, A DIV. OF AMERICAN CAN CO. CHEMICAL SALES DEPT. Agency—Maercklein Advertising 46

MINNEAPOLIS-HONEYWELL REGULATOR CO. Agency—The Aitkin-Kynett Co. 6

MONSANTO CHEMICAL CO. Agency—Gardner Adv. Co. 35

NATIONAL CARBON CO., DIV. OF UNION CARBIDE CORP. Agency—J. M. Mathes, Inc. 67

NEVILLE CHEMICAL CO. Agency—Bond & Starr, Inc. 61

NORTH AMERICAN CAR CORP. Agency—Roche, Rickerd & Cleary, Inc. .. 1

OLIN MATHIESON CHEMICAL CORP. Agency—Van Sant Dugdale & Co., Co., Inc. 55-58

ORONITE DIV., CALIFORNIA CHEMICAL CO. Agency—L. C. Cole Co... 8-9

PRESSED STEEL TANK CO. Agency—The Buchen Co. 7

PRIOR CHEMICAL CORP. Agency—Robertson Martin Adv. 54

PURE CARBONIC CO., DIV., AIR REDUCTION CO., INC. Agency—E. M. Freystadt Assoc., Inc. 11

RISDON MFG. CO. Agency—Emil, Mark & Co. 34

SILICONES DIV. UNION CARBIDE CORP. Agency—J. M. Mathes, Inc. .. 74

SINCLAIR PETROCHEMICALS, INC. Agency—Geyer, Morey, Madden & Ballard, Inc. 50

SWIFT & CO. Agency—Russell T. Gray, Inc. 47

TEXAS BUTADIENE & CHEMICAL CORP. Agency—Muller, Jordan & Herrick 14-15

TRUBEK LABORATORIES Agency—Ray Ellis Advertising ..... 2nd cover

UNION CARBIDE CHEMICALS CO., DIV. OF UNION CARBIDE CORP. Agency—J. M. Mathes, Inc. 33

UNION CARBIDE OLEFINS CO., DIV. OF UNION CARBIDE CORP. Agency—J. M. Mathes, Inc. 48-49

U. S. STEEL CORP. Agency—Batten, Barton, Durstine & Osborn, Inc. .. 76-77

VANDERBILT CO., R. T. Agency—Pearsall & Schael 34

VIRGINIA-CAROLINA CHEMICAL CORP. Agency—Albert Sidney Noble Adv. 45

VOGT MACHINE CO., HENRY Agency—Farson, Huff & Northlich Adv. ... 81

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ENGINEERING

Insulation Guide

A table-chart reference system to determine the most economical thickness of thermal insulation for any type of heat-using equipment has been developed by Union Carbide Chemicals Co. (South Charleston, W. Va.) and West Virginia University (Morgantown, W. Va.).

Prior to development of this set of tables, engineers worked out time-consuming mathematical formulas involving the cost of heat energy, cost of insulation, cost of capital and conductivities of various insulations at different temperatures.

"Manual on Economic Thickness of Insulation for Flat Surfaces and Pipes," soon to be published by the National Insulation Manufacturers Assn. (New York), gives insulation thickness methodology based on four factors: (1) cost of insulation; (2) cost of heat; (3) insulation conductivity; (4) economic thickness. Covered in the manual tabulations are 22 pipe sizes, ½ to 36 in., flat surfaces, temperature differences ranging from 90 to 1314 F, and insulation conductivities from 0.10 to 1.5.

PROCESSES

Hybrid Computer: Process control and development besides digital computation is now possible by use of a hybrid computer with analog and digital features. It was developed by Computer Systems Inc. (Monmouth Junction, N.J.) and called 5800 DYSTAG (Dynamic Storage Analog Computation). It it can simulate physical systems and still store and compute data.

•

Tackling Deviations: Unstable operating conditions can be spotted immediately with a subsystem available in TRW Computers Co.'s (Beverly Hills, Calif.) RW-300 digital control computer. Operating in addition to the normal control functions of the computer, the subsystem automatically scans 200 instruments/second, checks them against preset operating limits.

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Wood Treating: A new process that uses liquefied gas in a pressure vessel to deeply and cleanly deposit preservative chemicals in wood fibers has been developed by Koppers Co. (Pittsburgh).

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Opening for research and development chemist experienced in manufacture and use of wax compounds, wax emulsions, resins, polymer dispersions, cleaners and household chemicals in a manufacturing company laboratory located in the Middle West. Apply by letter, enclosing photograph and giving full details of education and experience. All replies will be confidential. P-6203, Chemical Week.

Manager $10-12,000. Research-Development- Mannfacturing. Due to expansion, our client a national manufacturer of chemical specialties, offers an unusual growth opportunity to a graduate chemist or chemical engineer with the following qalifications: Experience in creating and manufacturing emulsions, solution polymers of vinyl acetates, acrylics and acrylonitrile, styrenes, resins for coatings and wet strength and polyester resins. This position also requires supervisory experience as you will supervise 10 or more employees. Our client's plant is located in the vicinity of Philadelphia. There is no charge for our services. Reply in confidence by typewritten resume only to Jack Lewis, President, Lewis-Pearson Organization, Inc., Sales Consultants, 70 Darby Road, Paoli, Pa.

Development Chemists: Two permanent openings in large phosphate mining operation in Central Florida for M.S., Ph.D., graduates or B.S. and equivalent experience. 1. Chemist with special interest in development of inorganic analytical procedures. 2. Chemist with special interest in inorganic and physical chemistry to investigate the chemistry of phosphatic materials. Please send resume, including salary requirements to Industrial Relations Department, American Cyanamid Company, Brewster, Florida.

Sales Manager-Vinyl Resin-Experienced in the sale of polyvinylchloride polymers and copolymers to converter industries. Must also have backgroud in the sale of insulation compounds to electrical industry. Plant located in the East-Northeast. Liberal salary and benefits. Our employees are aware of this advertisement. P-6453, Chemical Week.

Here is an Opportunity—for a trained sanitary specialty chemist to join a rapidly expanding organization as assistant to the Executive Vice-President handling production, purchasing, and research. Our man has a fine future opportunity to grow with us in areas of responsibility and earnings. Starting salary will be commensurate with present earnings and need, with rich future potential. We are sanitary chemical manufacturers located in the eastern part of the United States. If you have a chemical education, experience in the formulation of sanitary maintenance chemical products, knowledge of quality controls, product development and if possible, production experience, send us the resume of your experience, age, education, and qualifications. Include a photograph of yourself. All replies will be held in the strictest of confidence. P-6485, Chemical Week.

This Tracer Section can be used whenever you are looking for or offering Equipment, Plants, Supplies, Chemicals, Opportunities, Special Services. The rates are low—just call or write Classified Advertising Division. Chemical Week, P.O. Box 12, N. Y. 36, N. Y., LOngacre 4-3000.

SELLING OPPORTUNITY WANTED

Manufacturer's Agent. Sales Executive with good technical background starting own agency seeks principals supplying raw materials and other products to the paint, plastics, ink and rubber industries in Metropolitan New York, New Jersey and lower Connecticut. Excellent references. Twenty years experience in above fields. RA-6473, Chemical Week.

CONTRACT WORK WANTED

Custom Drying—6000 Cu. Ft. Drying Space- truck tray dryers, unit or contract basis. CWW-6449, Chemical Week.

R&D Organization seeks projects for joint de- velopment, Chemical and engineering problems. Computer and lab facilities. CWW-6456, Chemical Week.

BUSINESS OPPORTUNITY

Complete Package Chemical Plants for Sale or Lease. Synthetic Nitric Acid Plant, 180,000 lb./day design capacity. Nitric Acid Concentrating Plant, 160,000 lb./day design capacity. Sulphuric Acid Concentrating & Recovery Plant, 52,392 tons/year capacity. Picric Acid & Ammonium Picrate Plants, (9) identical units, total capacity 18,500 lb./day picric acid, 180,000 lb./day ammonium picrate. For sale or lease on location or for removal. Completly developed plant site with all utilities. Midwest location. Perry, 1415 N. 6th St., Phila. 22, Pa.

PLANTS & PROPERTIES

New building for chemical or paint plant f.r sale-20,000 sq. ft. on five acres of land or more. Heavy industrial area, rail and all utilities. 15 minutes from midtown New York City in New Jersey or will build to order and rent to AA-1 company. FS-6461, Chemical Week.

EQUIPMENT FOR SALE

Baker-Perkins 100 gal. T347 stainless jacketed dispersion blade mixer, 25 HP TEFC drive, Perry, 1415 N. 6th St., Phila. 22, Pa.

Allis-Chalmers 5' by 5' ball mill, manganese liners, balls, scoop feeder. 75 HP motor & drive. Perry, 1415 N. 6th St., Phila. 22, Pa.

235 cu. ft. T304 Stainless powder hopper, 4'5" x 7'-4" x 9'-2" high, Dbl. cone bottom, portable—can be transported. Perry, 1415 N. 6th St., Phila.

465 gal T304L Stainless reactor, 150# internal WP, 165# jacket WP. Perry, 1415 N. 6th St., Phila. 22, Pa.

Nerco-Niro portable laboratory type spray dryer, stainless steel. Perry, 1415 N. 6th St., Phila. 22, Pa.

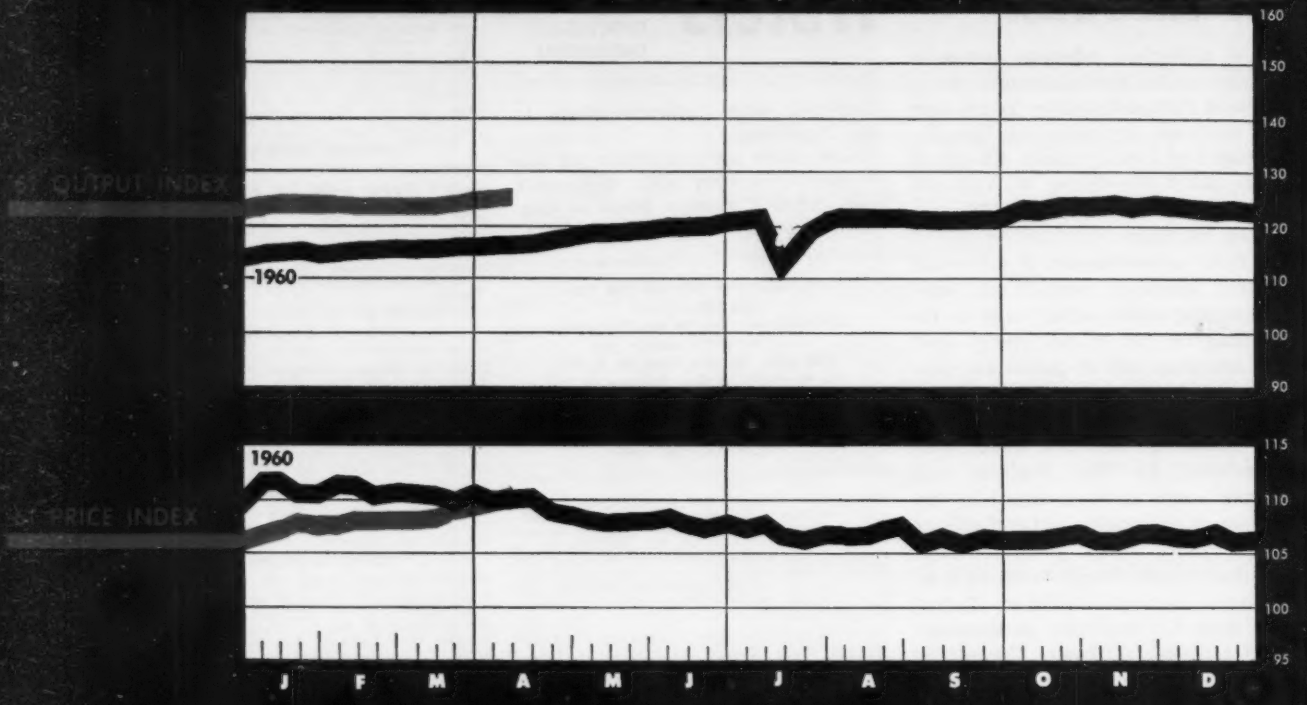
For sale-Stokes Mod. 59B, Rot. Vac. drum dryer, 3' dia. x 10' long, int. shallow, 304 SS, jack. 50 psig, int. full vac. 30 psig stm. press. ASME. 220-440/60/3, Cl. 1, Grp. D. Exppf. Brand new, in crate, avail. for imm. dely. Details, photos. on request. Ace Processing Equipment Co., 6825 S. Kenwood Ave., Chicago 37, Illinois.

CHEMICALS WANTED

Surplus Wanted—Chemicals, Pharmaceuticals, Oils, Acids, Plasticizers, Resins, Dyes, Solvents, Pigments, Etc. Chemical Service Corporation, 96-02 Beaver Street, New York 5, N.Y. HAnover 2-6970.

To Employers Who Advertise for Men: The letters you receive in answer to your advertisements are submitted by each of the applicants with the hope of securing the position offered. When there are many applicants it frequently happens that the only letters acknowledged are those of promising candidates. (Others do not receive the slightest indication that their letters have even been received, much less given any consideration.) These men often become discouraged, will not respond to future advertisements and sometimes even question if they are bona fide. We can guarantee that Every Advertisement Printed Is Duly Authorized. Now won't you help keep our readers interested in this advertising by acknowledging every application received, even if you only return the letters of unsuccessful applicants to them marked say, "Position filled, thank you." If you don't care to reveal your identity, mail them in plain envelopes. We suggest this in a spirit of helpful co-operation between employers and the men replying to Positions Vacant advertisements. Classified Advertising Division, McGraw-Hill Publishing Company. "Put Yourself in the Place of the Other Fellow."

BUSINESS BENCHMARKS



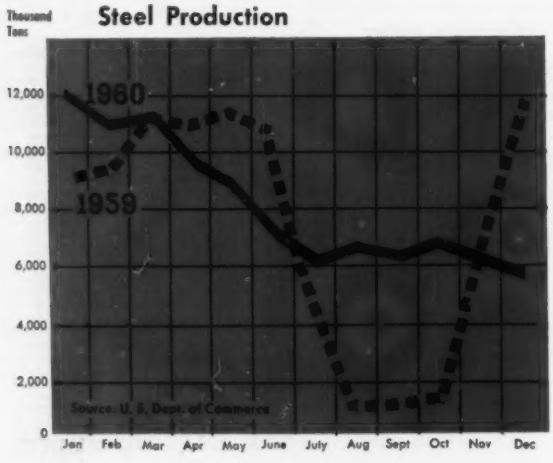
APRIL 8, 1961

WEEKLY BUSINESS INDICATORS	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	125.6	125.4	118.9
Chemical Week wholesale price index (1947=100)	111.0	110.9	110.7
Stock price index (12 firms, Standard & Poor's)	51.24	51.68	53.31
Steel ingot output (thousand tons)	1,611	1,574	2,597
Electric power (million kilowatt-hours)	14,291	14,295	14,062
Crude oil and condensate (daily av., thousand bbls.)	7,366	7,353	7,077

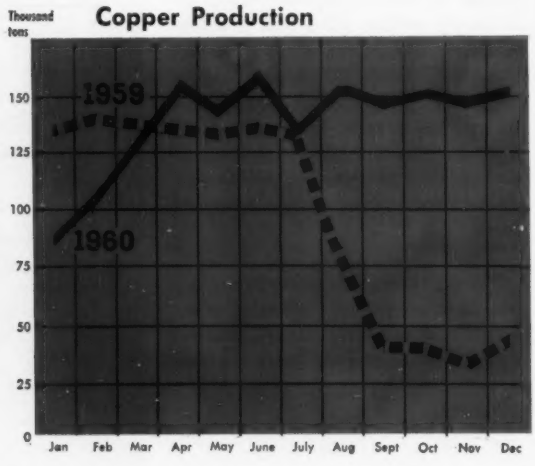
WHOLESALE PRICE INDICATORS (1947-49=100)	Latest Month	Preceding Month	Year Ago
All commodities (other than farm and foods)	128.0	128.0	128.7
Chemicals and allied products	110.8	110.4	110.0
Industrial chemicals	123.3	123.1	124.2
Paint and paint materials	123.9	123.6	122.2
Drugs, pharmaceuticals and cosmetics	94.6	94.2	94.0
Fats and oils (inedible)	54.3	50.1	49.4
Fertilizer and materials	112.2	112.2	108.8

CHEMICAL CUSTOMERS CLOSE-UP

Steel Production



Copper Production



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—	Boron Trifluoride, Compressed Gas Handling Information	TB-34691
—	Boron Trifluoride Dihydrate	DA-34671
—	Boron Fluoride Complexes with Nitrogenous Compounds	DA-3469-NIT-1
—	Boron Fluoride Complexes with Oxygen-Containing Compounds	DA-3469-OXY-1
—	Boron Trifluoride, Ether Complex, Tech.	DA-34711
—	Boron Trifluoride, Monoethylamine Complex, Technical	DA-34661
—	Boron Trifluoride, Phenol Complex, Technical	DA-34682

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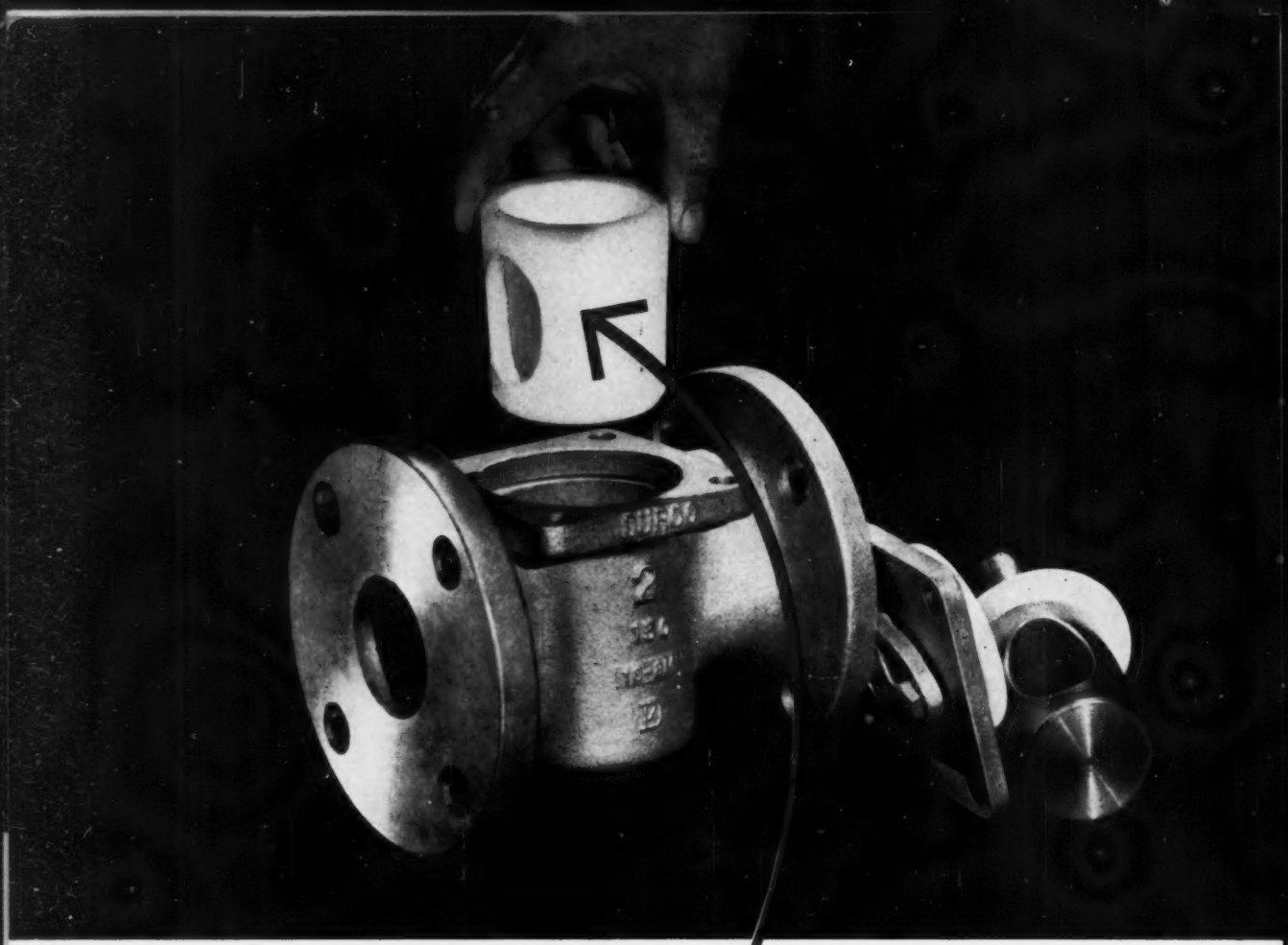

IT'S THE SEAL THAT COUNTS

A heavy Teflon® sleeve is the heart of the Durco SLEEVELINE® non-lubricated plug valve. Teflon's lubricity, pliability and chemical inertness provide nearly perfect resistance to sticking, leak through and corrosion.

The Durco designed sleeve completely surrounds the plug. Its large sealing area will withstand erosion, nicks, scoring and general wear for years in process liquid, gas or slurry applications. And it's heavy enough to allow up to ¼" vertical adjustment for wear.

Durco SLEEVELINE valves are designed and priced to replace ball valves, and lubricated plug valves wherever they are in use. Write for your copy of Bulletin V/12a.

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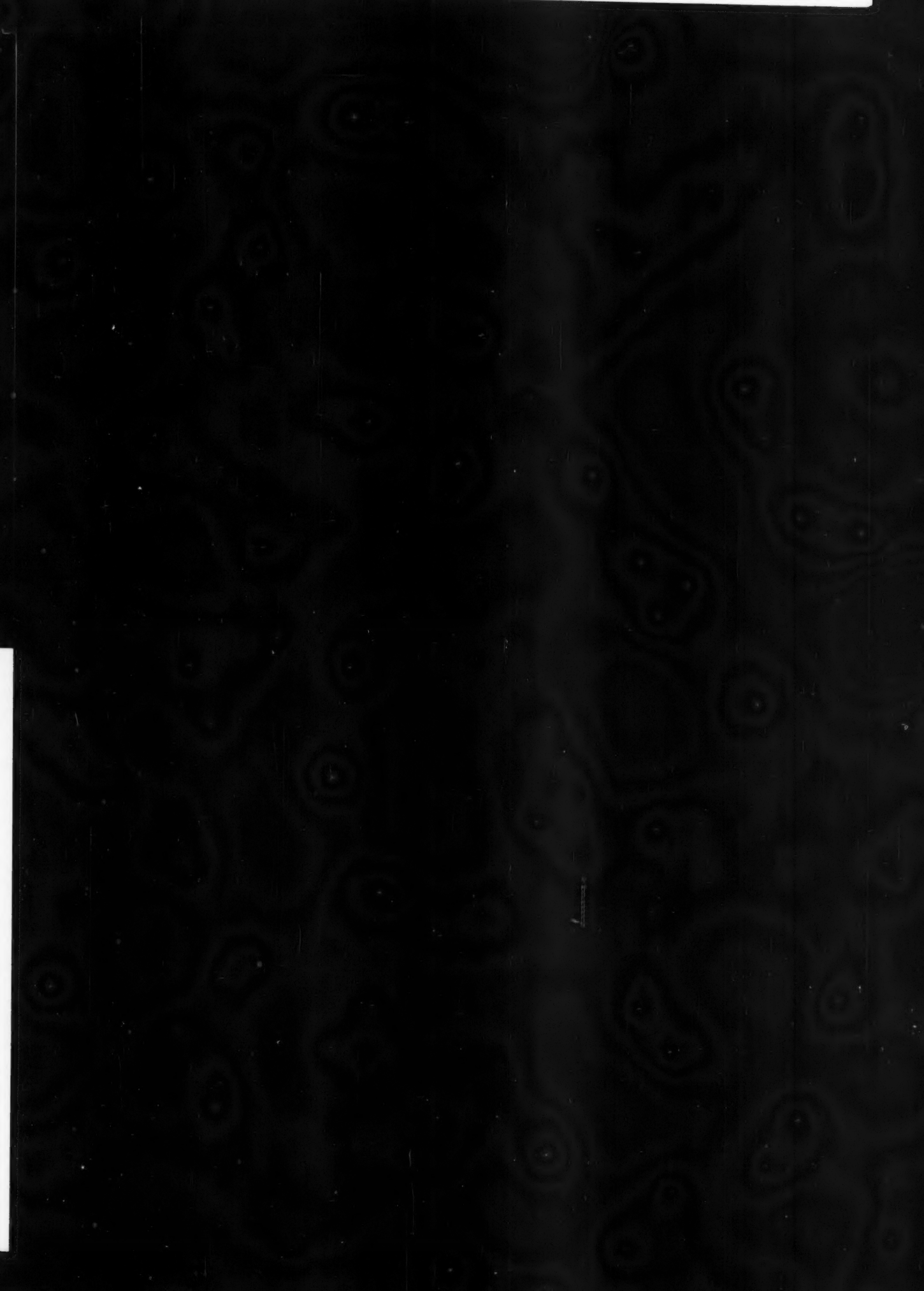
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